Addressing Lifestyle-Related Risk Factors Amid Moderate Colon Cancer Awareness for Enhancing Public Education and Prevention

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Abstract

Background: Colon cancer is a leading cause of cancer-related morbidity and mortality worldwide. Understanding population knowledge and identifying associated risk factors are critical for implementing effective preventive strategies. This study aimed to evaluate the knowledge, lifestyle, and dietary behaviors contributing to colon cancer risk among the Selangor population in Malaysia. Methods: A cross-sectional survey was conducted among 200 consented adult respondents from Selangor. Participants provided information on colon cancer knowledge, family history, lifestyle habits, and dietary practices. Data were analyzed to determine the correlation between knowledge levels and key risk factors, including obesity, diabetes, smoking, alcohol consumption, physical inactivity, and red meat intake. Results: The study revealed moderate knowledge of colon cancer, with 68.8% of respondents correctly identifying risk factors. Notably, 30% had a family history of colon cancer, and 27.5% had a family history of inflammatory bowel disease (IBD). The prevalence of obesity was high, with 32.5% categorized as Type 1 obese and 38.5% in Types 2 and 3. Additionally, 41% of respondents had a family history of diabetes, which increases colon cancer risk by 30-70%. Unhealthy lifestyle behaviors were prevalent, with 77.5% of respondents smoking and 85.5% consuming alcohol. Only 66% reported exercising four or more days weekly. Conclusion: Despite moderate awareness of colon cancer, poor lifestyle and dietary practices remain prevalent among the Selangor population, highlighting a critical gap between knowledge and behavior. Targeted educational campaigns and innovative awareness programs are urgently needed to emphasize the connection between lifestyle choices and colon cancer risk. Early screening initiatives, particularly for high-risk populations, are essential to reduce the disease burden effectively.

Keywords: Colon Cancer, Knowledge Level, Risk Factors, Lifestyle Behaviors, Public Health Awareness

Introduction

Globally, colorectal cancer (CRC) ranks among the leading causes of cancer morbidity and mortality, presenting a significant public health concern. In Malaysia, the disease burden is considerable, with an estimated 48,000 new cancer cases recorded across all types in 2020. Of these, colon cancer emerged as the second most prevalent malignancy, accounting for approximately 13.6% of all

Significance | This study demonstrates moderate colon cancer knowledge and emphasizes improving public education and preventive strategies for lifestyle-related risk factors.

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cases. Among males, it is second only to lung cancer, with around 3,500 cases reported, while for females, it ranks just after breast cancer, with 3,000 cases (Gandomani et al., 2017). This high incidence underscores the need for comprehensive research into the epidemiology, risk factors, and public awareness of colorectal cancer in Malaysia.

CRC is a malignancy originating from the epithelial tissue of the colon or rectum, collectively termed colorectal cancer. It is characterized by its insidious onset and its association with modifiable lifestyle factors, including diet, physical activity, and smoking (Soltani et al., 2019). Lifestyle changes over the past few decades, such as increased consumption of processed foods and reduced physical activity, have been linked to a rising trend in CRC cases worldwide (Vieira et al., 2017).

Despite advances in medical treatments and diagnostic technologies, early detection of CRC remains a significant challenge in many populations. In Malaysia, public awareness regarding CRC and its risk factors is relatively low. A study by Sindhu et al. (2019) indicated that the urban population in Klang Valley exhibited limited knowledge about CRC, reflecting a need for enhanced public health initiatives. Another Malaysian study highlighted moderate awareness levels among outpatient clinic attendees, yet misconceptions about CRC risk factors persisted (Pan et al., 2017). These findings align with global trends, where low awareness is a common barrier to early detection (Alshammari et al., 2020).

Key risk factors for CRC include obesity, diabetes, smoking, alcohol consumption, and dietary habits. Obesity, particularly a high body mass index (BMI), is strongly correlated with an increased risk of colorectal adenomas and cancer (Soltani et al., 2019). Furthermore, diabetes mellitus is associated with a 30% relative risk increase for colon cancer, reflecting the interplay between metabolic disorders and CRC development (Bosetti et al., 2020). Lifestyle behaviors such as smoking and alcohol use further exacerbate this risk. Studies have shown that heavy smoking increases CRC mortality rates, while alcohol consumption contributes significantly to cancer incidence globally (Huang et al., 2017; Song-Yi et al., 2020).

Dietary factors also play a critical role in CRC etiology (Table 3). High consumption of red and processed meats is linked to an elevated CRC risk, while diets rich in fruits and vegetables have been found to reduce this risk (Vieira et al., 2017; Lee et al., 2017). Despite these well-established associations, dietary practices in Malaysia remain concerning. A recent survey revealed that nearly all respondents consumed red meat regularly, yet vegetable and fruit consumption was suboptimal, highlighting a gap in nutritional awareness (Gede et al., 2018).

Physical inactivity is another critical modifiable risk factor. Research suggests that regular exercise significantly reduces CRC risk, but knowledge of its protective effects is limited among the Malaysian population (Nunez et al., 2018; Oruç & Kaplan, 2019).

Public health campaigns must therefore emphasize the importance of physical activity in CRC prevention.

Efforts to mitigate CRC incidence require a multifaceted approach, including public education campaigns, early screening programs, and promotion of healthy lifestyle practices. Increasing awareness about CRC risk factors, coupled with targeted interventions in high-risk groups, can significantly improve early detection and outcomes. This study aims to assess the level of CRC knowledge and awareness among adults in Selangor, providing valuable insights for shaping future public health strategies.

2. Materials and Methods

2.1 Study Design and Population

This cross-sectional study was conducted from July 2021 to December 2021 in Selangor, Malaysia. The study targeted all adults aged 18 years and above residing in Selangor. Both Malaysian and non-Malaysian residents within the specified age range were invited to participate. The exclusion of individuals younger than 18 years was based on the rarity of colorectal cancer (CRC) among pediatric and adolescent populations.

2.2 Sampling and Recruitment

A random sampling method was employed to select participants, ensuring an unbiased representation of the target population. Recruitment was conducted online through social media platforms and community networks, with the questionnaire hosted on Google Forms to facilitate accessibility.

2.3 Inclusion and Exclusion Criteria

The inclusion criteria for this study required participants to reside in Selangor, Malaysia, and to be 18 years old or older. Individuals who did not meet these criteria or who declined to provide informed consent were excluded from the study.

2.4 Ethics Approval

The study was conducted in full compliance with ethical standards. Ethical approval was obtained from the International Medical School, Management and Science University. Participants provided informed consent electronically before beginning the questionnaire. Participation was voluntary, and all data were anonymized to ensure confidentiality.

2.5 Data Collection Instrument

The survey instrument consisted of a structured, anonymous online questionnaire adapted from validated tools used in previous studies with necessary modifications to fit the local context. The questionnaire was divided into sections covering demographic information, knowledge of colorectal cancer risk factors, lifestyle practices, and family health history.

2.6 Statistical Analysis

The data were processed and analyzed using SPSS software (version 23). Descriptive statistics, including frequency distributions, were employed to summarize demographic characteristics and

Table 1. Socio demographic profiles of adults in Selangor

| Question	Answer	Total	Mean	(%)
Q1	Yes	194	0.97	97.0
	No/Maybe	6		3.0
Q2	Yes	185	0.93	92.5
	No/Maybe	15		7.5
Q3	Yes	167	0.84	83.5
	No/Maybe	33		16.5
Q4	Yes	174	0.87	87.0
	No/Maybe	26		13.0
Q5	Yes	154	0.77	77.0
	No/Maybe	46		23.0
Q6	Yes	164	0.82	82.0
	No/Maybe	36		18.0
Q7	Yes	134	0.67	67.0
	No/Maybe	66		33.0
Q8	Yes	125	0.63	62.5
	No/Maybe	75		37.5
Q9	Yes	120	0.60	60.0
	No/Maybe	80		40.0
Q10	Yes	108	0.54	54.0
	No/Maybe	92		46.0
Q11	Yes	103	0.49	48.5
	No/Maybe	97		51.5
Q12	Yes	83	0.42	41.5
	No/Maybe	117		58.5
Q13	Yes	85	0.43	42.5
	No/Maybe	115		57.5
Total Percentage of Respondents Have Knowledge	**68.8%**			
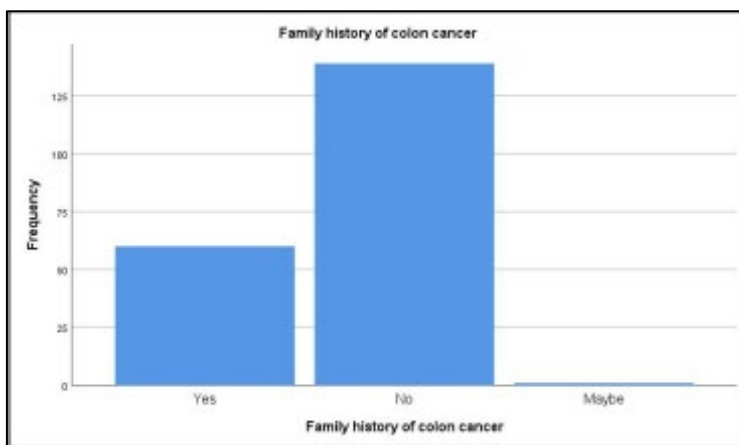
Figure 1. Exhibits the family history of Colon Cancer among adults in Selangor

Table 2. The study findings in terms of level of knowledge.

| Characteristic	Frequency	Percentage (%)
Gender		
Male	135	67.5
Female	65	32.5
Age		
18–29	41	20.5
30–39	55	27.5
40–49	51	25.5
50–59	36	18.0
<60	17	10.0
Ethnicity		
Malay	65	32.5
Chinese	75	37.5
Indian	60	30.0
Nationality		
Malaysian	200	100.0
Non-Malaysian	0	0.0
Education Level		
Foundation	6	3.0
Diploma	16	8.0
Degree	163	81.5
Master	15	7.5
Living Area		
Urban	42	21.0
Rural	158	79.0
BMI (Body Mass Index)		
Underweight	4	2.0
Normal Weight	45	22.5
Overweight	36	18.0
Obesity I	34	17.0
Obesity II	13	6.5
Obesity III	64	32.0
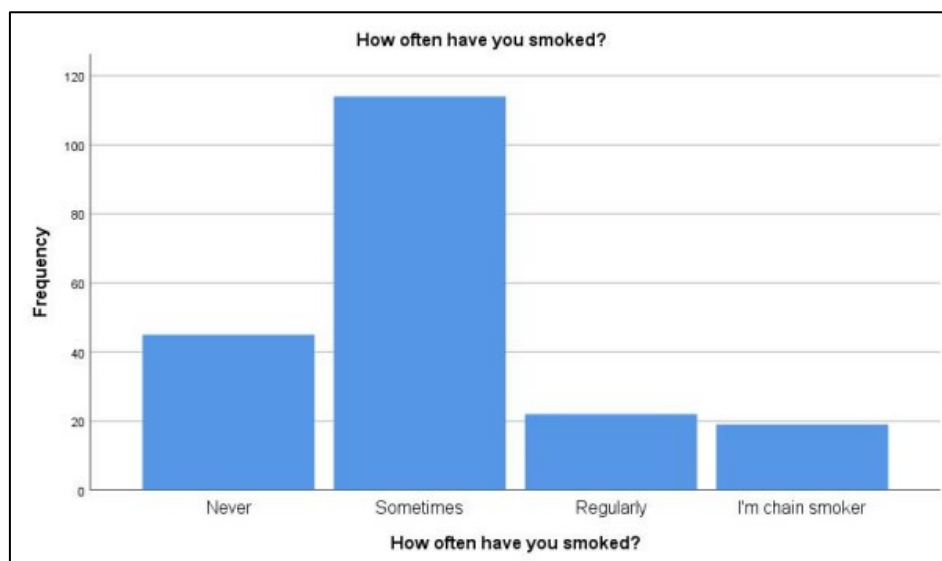
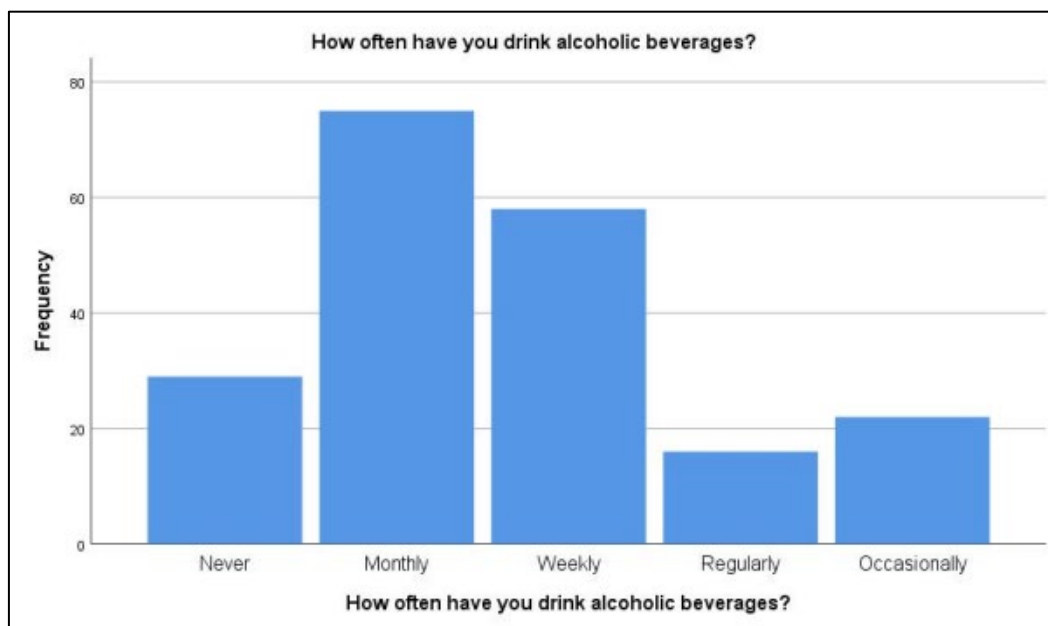**Figure 2.** The frequency of smoking among adults in Selangor

Figure 3. The risk factors of lifestyle practices Among the adults related to Colon Cancer
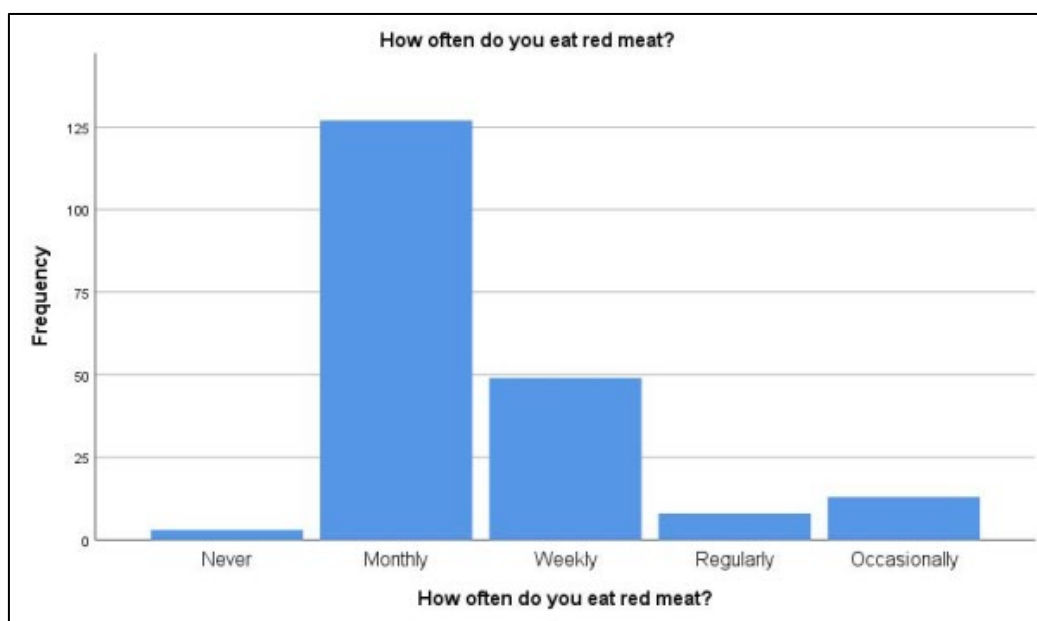
Figure 4. The frequency of eating red meat among adults in Selangor

Table 3. The Risk dietary factors among the adults related to Colon or Colorectal Cance

Food Groups	Saturated Fat (%)	Processed Meat (%)	Vegetables (%)	Fruits (%)
Never	1.0	3.5	0.0	0.0
Monthly	63.0	67.0	10.5	12.0
Weekly	25.5	21.5	9.0	13.5
Regularly	5.5	3.0	80.0	65.5
Occasionally	5.0	5.0	0.5	9.0
Total	**100%**	**100%**	**100%**	**100%**

responses. Results were presented in tables, graphs, and charts to enhance clarity and interpretability.

Statistical comparisons were made to assess the relationships between demographic factors, knowledge of CRC risk factors, and lifestyle behaviors. Descriptive analysis was particularly utilized to identify trends and summarize the overall findings effectively.

3. Results

A total of 200 Malaysian adults residing in Selangor participated in this study. The majority of the participants were men (67.5%), and most were of Chinese ethnicity (37.5%). All respondents were Malaysian citizens (Table 1).

Regarding knowledge of colon cancer risk factors, 68.8% of participants demonstrated awareness, while the remaining 31.2% were unaware. The questions used in the study primarily focused on identifying risk factors through close-ended questions, which might have influenced the outcomes (Table 2). Interestingly, the participants' scores on risk factor awareness were not significantly influenced by their age, academic performance, or level of knowledge (Figures 1, 2, 3 and 4).

A significant portion of the respondents (30%) reported having a family history of colon cancer, and 27.5% had a family history of inflammatory bowel disease (IBD). Despite these familial risk factors, the overall level of awareness regarding colon cancer was moderate, with a notable proportion of respondents selecting incorrect answers related to risk factors.

Lifestyle factors revealed concerning trends among the participants. A majority (77.5%) were smokers, and 85.5% reported alcohol consumption. In contrast, only 66% of respondents engaged in physical exercise four or more days per week. These findings highlight a gap between lifestyle behaviors and awareness of colon cancer risk factors. Additionally, the data showed that 32.5% of participants were classified as obese (BMI between 30.0 and 34.9 kg/m²), while 38.5% fell into higher obesity categories (BMI ≥ 35.0 kg/m²), indicating a heightened risk for colon cancer.

Dietary habits also presented areas of concern. Nearly all participants (98.5%) consumed red meat, with 4% eating it regularly. Furthermore, 21.5% consumed processed meat, which is associated with an increased risk of colon cancer. On a positive note, 80% of respondents reported consuming vegetables, and 65.5% ate fruits, although their intake levels were not quantified.

The study also explored medication use, finding that 67% of participants regularly took NSAIDs. Previous research has suggested a protective effect of long-term NSAID use against colon cancer, and this aspect warrants further investigation.

Overall, these results emphasize the moderate level of knowledge regarding colon cancer risk factors among the Selangor population, combined with concerning lifestyle behaviors that may increase their risk of developing colon cancer.

4. Discussion

We aimed to assess the knowledge and risk factors of colon cancer among the Selangor population. Despite its limited scale, the study achieved its intended participation target with 200 respondents, of whom 30% had a family history of colon cancer and 27.5% reported a family history of inflammatory bowel disease (IBD). The findings reveal a moderate level of knowledge about colon cancer among respondents, with many unable to correctly identify risk factors. This aligns with the study by Pan et al. (2017), which found a sufficient understanding of colon cancer among 308 respondents at Serdang Hospital, contrasting with the findings in Riyadh, where knowledge levels were inadequate among 245 subjects (Alshammari et al., 2020). The results emphasize the need for improved awareness campaigns targeting the Selangor population. The demographic profile of respondents showed that the majority (27.5%) were aged 30-39 years. While colon cancer risk generally increases after the age of 50, the rising prevalence of obesity among younger individuals may contribute to early-onset cases (Gandomani et al., 2017). Notably, 79% of participants were from rural areas, and only 68.8% demonstrated knowledge of colon cancer risk factors. Sindhu et al. (2019) similarly reported low awareness levels among urban populations in Klang Valley, further underscoring the pervasive lack of education about colon cancer across different settings.

Obesity was a significant risk factor identified in this study, with 32.5% of respondents classified as obese type 1 (BMI: 30.0–34.9 kg/m2) and an additional 38.5% falling into obesity types 2 and 3 (BMI > 35.0 kg/m2). This high prevalence of obesity is concerning, as Soltani et al. (2019) established a strong association between elevated BMI and increased risk of colorectal adenomas and cancer. Additionally, 41% of respondents had a family history of diabetes, which further compounds their risk of developing colon cancer. According to Soltani et al. (2019), individuals with diabetes mellitus have a 70% increased risk of colon cancer compared to non-diabetic individuals.

Lifestyle behaviors such as smoking, alcohol consumption, and physical inactivity were prevalent among respondents. Smoking was reported by 77.5% of participants, and 85.5% consumed alcohol. Huang et al. (2017) found that smoking significantly increases colon cancer risk, particularly among individuals who smoke more than 11 cigarettes daily for over 30 years. Similarly, Song-Yi et al. (2017) identified a 19% increase in colon cancer incidence associated with weekly alcohol consumption exceeding 100 grams. These behaviors highlight critical intervention points for public health initiatives aimed at reducing colon cancer risk through lifestyle modifications.

Physical activity emerged as another crucial determinant, with only 66% of respondents reporting exercise more than four times per week. This finding contrasts with studies emphasizing the

protective role of regular physical activity against colon cancer (Oruç & Kaplan, 2019). For example, Núñez et al. (2018) reported that physically inactive individuals face a 25–50% higher risk of developing colon cancer than their active counterparts. Encouraging greater participation in physical activity may serve as an effective prevention strategy.

Dietary habits were also examined, revealing that 98.5% of respondents consumed red meat, although only 4% did so regularly. Processed meat consumption was lower, with 21.5% of participants reporting regular intake. A systematic review by Vieira et al. (2017) established a positive correlation between red meat intake and colon cancer risk. Conversely, higher consumption of fruits and vegetables—reported by 80% and 65.5% of respondents, respectively—is associated with reduced colon cancer risk, as highlighted by Lee et al. (2017). However, the conflicting results from large prospective studies necessitate further investigation into the role of plant-based diets in colon cancer prevention.

The use of non-steroidal anti-inflammatory drugs (NSAIDs) was another noteworthy finding, with 67% of respondents reporting regular use. Aspirin, in particular, has been shown to reduce colon cancer risk significantly. Qiao et al. (2018) demonstrated that long-term aspirin use lowers the incidence and mortality of colon cancer, with optimal effects observed at doses of 75 mg daily. This protective effect underscores the potential role of NSAIDs in chemoprevention, although careful consideration of the associated risks is warranted.

5. Conclusions

In conclusion, this study provides valuable insights into the knowledge and risk factors of colon cancer among the Selangor population. The moderate knowledge levels, high prevalence of obesity, diabetes, and unhealthy lifestyle behaviors highlight the urgent need for targeted educational campaigns and preventive strategies. By addressing these risk factors, public health initiatives can significantly reduce the burden of colon cancer in Malaysia.

Author contributions

S.R. conceptualized and designed the study. D.T.S., A.S., and B.G.S. collected and analyzed the data. S.K. and J.K. contributed to data curation and statistical analysis. S.M.A., H.A.A.G., and A.F. provided critical revisions to the manuscript. R.K.S. and M.K. reviewed the methodology and ensured the study's rigor. S.R., A.S., and J.K. drafted the manuscript, and all authors reviewed and approved the final version.

Competing financial interests

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