Original article

The Influence of Lifestyle and Evolutionary Factors on Colorectal Cancer

Khayriyah Albahi [ID]**, Esra Oun*** [ID]**, Souad Salem** [ID]

Department of Therapeutic Nutrition, Faculty of Health Sciences, University of AL-Zawia, Al-Ajailat, Libya
***Corresponding email.** e.oun@zu.edu.ly*

Abstract
This study aimed to estimate the incidence of colorectal cancer by age and sex, and evaluate the association between lifestyle and risk of colorectal cancer. A self-administered questionnaire was conducted on Sixty (60) Libyan patients aged 20-80 years (47 males and 13 females) at the National Institute for the Treatment of Oncology in Sabrata, during the period from February to July 2023. The results showed that 46.3% of CRC cases are female, while 53.7% of CRC cases are male. and 20.1% of CRC cases were aged less than 50 years, while 79.1% of CRC aged More than 50 years. The colorectal cancer injury happens mostly in men higher than in women, the disease mostly occurs in patients above 50 years old. The findings suggest that age and sex may influence CRC risk, underscoring the need for targeted screening and lifestyle interventions, particularly for older adults and men. Further research with larger samples is recommended to validate these associations.
Keywords. Lifestyle, Evolutionary Factors, Colorectal Cancer.

Introduction
Cancer is identified as a major health issue in Libya [1], ranking as the second leading cause of death after cardiovascular diseases [2]. According to global statistics, approximately 151,000 new cases of colorectal cancer were recorded in 2003. Data indicates that around 41% of colorectal cancer cases affect the proximal colon, 22% involve the distal colon, and 28% occur in the rectum [1].
The World Health Organization (WHO) highlighted that food-related risks are associated with certain types of cancer, including colorectal, prostate, stomach, liver, mouth, and pharynx cancers. Studies have also shown a link between cancer risks and factors such as poor dietary habits, smoking, the ratio of animal to plant-based foods consumed, food quality, cooking methods, and overall lifestyle [3]. However, the lack of quality medical and nutritional care in North Africa contributes to higher mortality rates related to cancer [4]. While no diet can completely prevent cancer, certain foods can support overall health, strengthen the immune system, and lower cancer risks [5].
Healthy nutrition is a process in which the right food is eaten and used by the body for growth and tissue repair [6]. Consuming sufficient amounts of fruits, vegetables, fiber, and antioxidants can help maintain overall health and reduce the likelihood of developing cancer. These foods also help patients diagnosed with cancer get the right diet to fight the disease [7]. Fruits and vegetables contain an abundance of vitamins, minerals, and antioxidants, which support a healthy weight and may minimize the risk of colorectal cancer, especially in the early stages of the disease. Poor dietary habits are responsible for about 30% of cancer cases in developed countries and 20% in developing nations [3]. This study was conducted to evaluate the incidence of colorectal cancer by age and sex, and to estimate the association between lifestyle and the risk of colorectal cancer.

Methods
Data were obtained from the National Institute for the Treatment of Oncology in the city of Sabrata. and total of 793 cases (261 males and 207 females) were diagnosed with colorectal cancer during 2022-2023. Data were analyzed and the percentage formula of colorectal cancer using the SPSS V25 program.
A self-administered questionnaire was conducted on Sixty (60) Libyan patients aged 20-80 years (47 males and 13 females) at the National Institute for the Treatment of Oncology in Sabrata, during the period from February to July 2023. Data was collected on a form (questionnaire) during the interview with each patient. Participants were asked to report their dietary habits during one to three years before getting hurt by cancer. The questions were only focused on the family history of cancer patients, lifestyle factors including eating red meat, fast foods, drinking water and eating fruits and vegetables, exercise, and smoking status.

Results
Table 1 shows that 793 cases have different types of cancer, of which 43.4% have breast cancer, 18.8% have colon cancer, 17.3% have Thyroid cancer, 11.5% have prostate cancer, and 9.1% have lung cancer.
It's interesting to note that among cases of colorectal cancer (CRC), 46.3% are women, while a slightly larger portion, 53.7%, are men. This highlights an intriguing gender divide in the prevalence of the disease.

Table 1. Distribution of patients according to different types of cancer.

Types of cancer	No	%
Breast cancer	344	43.4
Colon cancer	149	18.8
Thyroid	137	17.3
Prostate	91	11.5
Lung	72	9.1

Table 2. Distribution of patients according to their gender

Sex	CRC cases (147)	%
Female	69	%46.3
Male	80	%53.7
Total	149	%100

Table 3 shows that 20.1% of CRC cases are aged less than 50 years, while 79.1% of CRC aged More than 50 years.

Table 3. Showcases the breakdown of patients based on their age groups.

Age	CRC cases (147)	%
<50 years	30	%20.1
>50 years	119	%79.9
Total	149	%100

The analysis in Table 4indicates no significant association between physical activity and CRC disease (x^2 = 3.240, p-value = 0.198 > 0.05). Similarly, alcohol intake does not show a statistically significant link with CRC (x^2 = 1.035, p-value = 0.309 > 0.05). These results suggest that, within this study, neither physical activity nor alcohol consumption significantly influences the risk of developing CRC. In contrast, the Chi-square test reveals a strong association between smoking history and CRC disease (x^2 = 28.253, p-value = 0.000 < 0.05). This finding underscores the well-documented role of smoking as a major risk factor for colorectal cancer. Additionally, the analysis identifies a highly significant association between facing severe grief and CRC (x^2 = 48.167, p-value = 0.000 < 0.05), suggesting that psychological stress may play a critical role in disease development.

Table 4. Delves into the intriguing connection between various lifestyle factors and colorectal cancer (CRC) among the groups of cases and controls.

Variable		CRC case		Controls case		Chi Square	-value
		NO	%	NO	%		
Physical Activity	Inactive	50	83.3	43	71.7	3.240	0.198
	Moderate	10	16.7	12	20.0		
	Active	00	0.	5	8.3		
Alcohol intake	Never	60	100.0	57	95.0	1.035	0.309
	Rarely	00	0.	3	5.0		
Smoking history	Non smoker	13	21.7	42	70.0	28.253	0.000
	Passive Smoker	22	36.7	8	13.3		
	Smoker	25	41.7	10	16.7		
Severe grief	yes	50	83.3	12	20.0	48.167	0.000
	No	10	16.7	48	80.0		

Table 5 shows that the chi-square test for the association between BMI level and getting CRC disease equals 33.902 with p-value = 0.000 < 0.05. This means that there is a significant association between BMI level and getting CRC disease.

Table 5. Association between Body Mass Index and CRC among cases and controls groups

Variable		CRC case		Controls case		Chi Square	P-value
		NO	%	NO	%		
Body Mass Index (BMI)	Under Weight	4	% 7	7	%12	33.902	0.000
	Normal	14	%23	39	%65		
	Over weight	13	%21	11	%18		
	Obese	29	%49	3	%5		

Table 6 revealed the association between dietary pattern and CRC among case and control groups. There is a significant association between getting CRC disease and each one of eating more than 500g/week red meat, eating more than 25g processed meat, eating fresh fish less than once a week, eating canned fish less than once a week, low calcium rich diet, low eating fruits and Vegetables, eating fast food, drinking soft drink, and drinking fruit juice. There is no significant association between getting CRC disease and spicy food and eating brown bread.

Table 6. Association between dietary pattern and CRC among case and control groups.

Variable		CRC case		Controls case		Chi Square	P-value
		NO	%	NO	%		
Red meat/WK	<500 g	21	35.0	34	56.7	0.874	0.350
	> 500 g	39	65.0	26	43.3		
Processed meat/ WK	<250 g	21	35.0	37	61.7	8.543	0.003
	>250 g	39	65.0	23	38.3		
Fresh Fish	<Once/ WK	44	73.3	33	55.0	4.385	0.036
	>Once / WK	16	26.7	27	45.0		
Canned fish	<Once/ WK	44	73.3	22	36.7	16.296	0.000
	>Once / WK	16	26.7	38	63.3		
Calcium-rich diet	Less than 4/wk.	39	65.0	14	23.3	23.845	0.000
	More than 4/wk.	9	15.0	10	16.7		
	Daily	12	20.0	36	60.0		
Fruits and Vegetables	Less than 4/wk.	35	58.3	7	11.7	29.630	0.000
	More than 4/wk.	12	20.0	19	31.7		
	Daily	13	21.7	34	56.7		
Spicy food	No	9	15.0	14	23.3	1.577	0.665
	1-2/ wk	8	13.3	8	13.3		
	3-6/ WK	15	25.0	15	25.0		
	Daily	28	46.7	23	38.3		
Fast food	No	19	31.7	34	56.7	12.657	0.005
	1-2/wk.	11	18.3	12	20.0		
	6-3	26	43.3	9	15.0		
	Daily	4	6.7	5	8.3		
Soft drink	No	15	25.0	33	55.0	11.25	0.001
	Yes	45	75.0	27	45.0		
Fruit juice	No	16	26.7	38	63.3	16.296	0.000
	Yes	44	73.3	22	36.7		
Brown bread eaters	No	43	71.7	35	58.3	2.344	0.126
	Yes	17	28.3	25	41.7		

Discussion

The findings of this study provide valuable insights into the association between lifestyle factors and the risk of colorectal cancer (CRC) among Libyan patients. The results are consistent with global research, emphasizing the role of lifestyle and dietary habits in the development of CRC.

The study revealed that CRC cases are more prevalent among males (53.7%) compared to females (46.3%), aligning with previous findings that suggest men are at a slightly higher risk of developing CRC. Additionally, the majority of CRC cases (79.1%) were observed in individuals aged over 50 years, which is consistent with global statistics indicating that advancing age is a significant risk factor for CRC [14].

The analysis showed significant associations between several lifestyle factors and CRC incidence. Smoking was identified as a strong risk factor [18,19] with a significant difference between CRC cases and controls (p < 0.05). This finding supports existing evidence that links smoking to an increased risk of CRC, as it promotes inflammation and DNA damage [8]. Another notable finding is the strong association between severe grief and CRC risk (p < 0.05). Chronic psychological stress has been linked to immune system dysregulation, which may contribute to cancer development [10].

Dietary habits also played a critical role in CRC risk. The consumption of red and processed meat in higher quantities (>500 g/week and >250 g/week, respectively) was significantly associated with an increased risk of CRC (p < 0.05). These findings align with the World Cancer Research Fund (WCRF) recommendations, which highlight the carcinogenic effects of processed meats and the risks associated with excessive red meat consumption [15]. The study further indicated that limited intake of fresh fish, canned fish, calcium-rich foods, fruits, and vegetables significantly increased CRC risk. Patients who consumed these foods less than once per week or in low quantities were more likely to develop CRC. This is consistent with evidence showing

that a diet rich in fruits, vegetables, and calcium supports colorectal health and reduces cancer risk through anti-inflammatory and antioxidant mechanisms [9].

The analysis of BMI revealed a significant association between obesity and CRC ($p < 0.05$). Nearly half of the CRC cases in this study were obese, underscoring the role of excess body weight in increasing CRC risk [23,24]. Obesity is known to contribute to CRC through mechanisms such as insulin resistance, chronic inflammation, and alterations in gut microbiota [11]. Although the study did not find a significant association between physical activity and CRC, [18]. It is well-established in the literature that regular exercise reduces the risk of CRC by improving metabolic health and reducing inflammation [12,20-22].

The consumption of fast food, soft drinks, and fruit juice was significantly associated with CRC risk. These findings highlight the role of highly processed, calorie-dense foods and sugary beverages in promoting obesity and metabolic imbalances, which are linked to CRC [13]. Conversely, the study found no significant association between CRC risk and the consumption of spicy foods or brown bread.

The results of this study underscore the urgent need for public health interventions in Libya to address modifiable risk factors for CRC. Promoting awareness about healthy dietary practices, reducing tobacco use, managing stress, and encouraging regular physical activity may help reduce the burden of CRC. Furthermore, improving access to quality medical and nutritional care is essential to mitigate cancer-related morbidity and mortality in North Africa.

Conclusion
In conclusion, this study highlights the significant associations between CRC and modifiable lifestyle factors, including diet, smoking, and obesity. These findings provide a foundation for future research and public health strategies aimed at reducing CRC risk in Libya and similar regions.

Conflict of interest. Nil

References
1. El Mistiri M, Pirani M, El Sahli N, El Mangoush M, Attia A, Shembesh R, et al. Cancer profile in Eastern Libya: incidence and mortality in the year 2004. Ann Oncol. 2013;21:1924-6.
2. Singh R, Al-Sudani O. Cancer mortality in Benghazi, Libyan Arab Jamahiriya, 1991-96. East Mediterr Health J. 2001;7:255-73.
3. Miftah MA, Smeo M. Epidemiologic Features of Colorectal Cancer in Zlitan City, Libya. AlQalam Journal of Medical and Applied Sciences. 2023 Dec 17:816-21.
4. Ermiah E, Abdalla F, Buhmeida A, Larbesh E, Pyrhonen S, Collan Y. Diagnosis delay in Libyan female breast cancer. BMC Res Notes. 2012;5:2-8.
5. Dyer D. Can food reduce your risk of breast cancer? Breastcancer.org; 2014 [cited 2025 Jun 29]. Available from: http://www.breastcancer.org/tips/nutrition/reduce_risk/reduce_risk
6. Varmus H. Overview of nutrition in cancer care. National Cancer Institute; 2013 [cited 2025 Jun 29]. Available from: http://www.cancer.gov/cancertopics/pdq/supportivecare/nutrition/Patient/page1
7. Alraes A, Alriqeee K, Abugrain H, Abuagela M, Bensaud B, Doggah H, Gwili F. Nutritional Supplementation in the Elderly Population: A Review Study. AlQalam Journal of Medical and Applied Sciences. 2025 Apr 29:716-24.
8. Botteri E, Iodice S, Bagnardi V, Raimondi S, Lowenfels AB, Maisonneuve P. Smoking and colorectal cancer: a meta-analysis. JAMA. 2008;300(23):2765-78.
9. Brennan CA, Garrett WS. Gut microbiota, inflammation, and colorectal cancer. Annu Rev Microbiol. 2021;75:293-319.
10. Chida Y, Hamer M, Wardle J, Steptoe A. Do stress-related psychosocial factors contribute to cancer incidence and survival? Nat Clin Pract Oncol. 2008;5(8):466-75.
11. Keum N, Giovannucci E. Global burden of colorectal cancer: Emerging trends, risk factors and prevention strategies. Nat Rev Gastroenterol Hepatol. 2019;16(12):713-32.
12. Moore SC, Lee IM, Weiderpass E, et al. Association of leisure-time physical activity with risk of 26 types of cancer in 1.44 million adults. JAMA Intern Med. 2016;176(6):816-25.
13. Schlesinger S, Neuenschwander M, Schwedhelm C, et al. Food groups and risk of colorectal cancer. Int J Cancer. 2019;144(5):1065-75.
14. Siegel RL, Miller KD, Goding Sauer A, et al. Colorectal cancer statistics, 2020. CA Cancer J Clin. 2020;70(3):145-64.
15. World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR). Diet, nutrition, physical activity and colorectal cancer. Continuous Update Project Expert Report. 2018 [cited 2025 Jun 29]. Available from: https://www.wcrf.org
16. Ermiah E, Abdalla F, Buhmeida A, Larbesh E, Pyrhönen S, Collan Y. Diagnosis delay in Libyan female breast cancer. BMC Res Notes. 2012;5(1):452.

17. Cetel N. Gender-specific screening for colon cancer: Why women are at higher risk. MedPage Today. 2023 Mar 29 [cited 2025 Jun 29]. Available from: https://www.medpagetoday.com

18. Li X, Chang Z, Wang J, et al. Unhealthy lifestyle factors and the risk of colorectal cancer: a Mendelian randomization study. Harbin (China): The Second Affiliated Hospital of Harbin Medical University; 2024.

19. Thomson B, et al. Association of childhood smoking and adult mortality: Prospective study of 120,000 Cuban adults. Global. 2020;8:e850-7.

20. Lee HH, et al. Association between regular physical activity and lower incidence of colorectal cancer in patients with diabetes mellitus: A nationwide cohort study. Disease. 2023;25:1588-97.

21. Ahmadi MN, et al. Vigorous physical activity, incident heart disease, and cancer: how little is enough? Eur J. 2022;43:4801-14.

22. Stamatakis E, et al. Vigorous intermittent lifestyle physical activity and cancer incidence among nonexercising adults. JAMA Oncol. 2023. https://doi.org/10.1001/jamaoncol.2023.1830

23. Wang Q, Zhou W. Roles and molecular mechanisms of physical exercise in cancer prevention and treatment. J Sport Sci. 2021;10:201-10.

24. Center MM, Jemal A, Smith RA, Ward E. Worldwide variations in colorectal cancer. CA Cancer J Clin. 2009;59(6):366-78.