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Assessment of the Risk Factors of Colorectal Carcinoma in Hiwa Hospital in Sulaimani City/Iraq

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Abstract

Background: Etiological studies have identified several modifiable and non-modifiable risk factors that have a role in developing colorectal cancer.

Aim of the Study: This study aimed to assess the risk factors of colorectal carcinoma in Hiwa Hospital in Sulaimani City / Iraq.

Methods: A case-control study design was used to conduct the present study. From November 2021 to May 2022, 300 participants were included in the present study. Data were analyzed using the statistical package for the social sciences version 25.0. A P-value ≤ 0.05 is considered a significant value.

Results: Patients mean age ± SD was 55.8 ± 16.14 years (ranging from 22 – 91), and the controls mean ± SD age was 52.17 ± 13.9 years (ranging from 20 to 87 years). (50%) of cases had a family history of colorectal cancer. Logistic regression analysis revealed that there are positive statistically significant associations between colorectal cancer and having a family history of colorectal cancer, obesity, being overweight, living in urban areas, eating raw red meat, did not eat fruits and vegetables, drinking canned juice, sugar-sweetened juice, and carbonated beverages, and illiteracy (P < 0.05).

Conclusions: The was a positive association between colorectal cancer and having a family history of colorectal cancer, obesity, being overweight, eating raw red meat, drinking canned juice, sugar-

sweetened juice, and carbonated beverages, living in an urban, did not eat fruits and vegetables, and illiteracy.

Keywords: Colorectal Cancer, Cancer, Risk Factors, Dietary Intake

Introduction

Centers for disease control and prevention defined colorectal cancer (CRC) as cancer that occurs in the colon or rectum (1). CRC is the third most diagnosed cancer and the second most common cause of cancer mortality worldwide (2). CRC accounts for 9% to 10% of human cancers (3). The incidence is steadily rising in developing nations, with more than 1.9 million cases and 850 000 deaths annually (4). The World Cancer Research Fund Report (WCRF) and the American Institute for Cancer Research (AICR) have linked this increase to the drastic changes in lifestyle and food consumption patterns such as high daily calorie intake, increased consumption of carbohydrates, and sedentary lifestyle plus increased sitting time regardless of physical activity. These factors have synergized with the genetic factors of cancer among the population, resulting in a noticeable increase in the incidence of cancer (5). CRC typically originates with the noncancerous growth of mucosal epithelial cells, also known as polyps. These polyps might grow slowly for 10-15 years before turning malignant (3). When certain lower gastrointestinal symptoms are experienced, CRC may be suspected. In the early stages of CRC, symptoms may be completely absent, and in a significant percentage of patients, the tumor is an incidental finding during abdominal surgery or endoscopic examinations (6). Rectal bleeding, abdominal masses, abdominal pain, changes in bowel habits, unexplained weight loss, and iron deficiency anemia are among the symptoms of the disease in its advanced stages (7). Most CRC patients are diagnosed late when the tumor has already grown into a clinically detectable size causing alarming symptoms and signs. It has been attributed mainly to a lack of screening, poor awareness of the disease's early symptoms, and a disconnected healthcare system (8). CRC etiology has led to the identification of several modifiable and non-modifiable risk factors that have a role in the development of CRC (9). Non-modifiable risk factors of CRC include; race and ethnicity, sex, age, hereditary mutations, inflammatory bowel disease, abdominal radiation, and modifiable risk factors include; obesity and waist circumference, physical inactivity, diet, smoking, alcohol, medication, and diabetes and insulin resistance (10). Many studies have shown that eating lots of fresh red and processed meat increases the risk of bowel cancer (11). The positive effects of fruits and vegetables come from many potentially protective substances that affect different biochemical pathways (12). Consumption of fruit and vegetables could reduce CRC risk through anti-carcinogenic components, such as antioxidants and isothiocyanates, the induction of detoxification enzymes by cruciferous vegetables, and protease inhibitors that might influence DNA damage and thus reduce mutations. Accumulating evidence suggests that alcohol and smoking cessation, a healthy diet (consumption of milk, whole grains, fresh fruits, fiber, and vegetables), and regular exercise (daily physical activity of at least 30 min) can prevent the development of CRC (13).

Method

Design of the Study

A case-control study design was used to carry out the present.

Settings of the Study

The study was conducted in two governmental hospitals in Sulaimani City, including; Hiwa Cancer Hospital and Shar Hospital, in Sulaymaniyah Governorate, Kurdistan Region / Iraq.

Sample and Sampling of the Study

A total of 300 participants were included in the present study. Including 100 patients with CRC diagnosed and admitted to Hiwa Cancer Hospital were included, and in the same period as controls, 200 individuals who visited the Shar hospital for medical conditions other than CRC disease or the patient's attendants who were free from CRC were included in the present study. The controls were age (± 5 years) and gender-matched with CRC patients.

Inclusion Criteria

CRC patients of both gender at any age attending the Hiwa Hospital. CRC patients should be diagnosed in 2019 and later. CRC patients were confirmed by histopathologic examination of the tissue biopsy and patients with clinical data that has been recorded and is accessible.

Exclusion Criteria

Patients who are very tired and unable to answer the questions, and patients with unconfirmed diagnoses or patients with uncompleted diagnosis processes during the data collection period.

Administrative Arrangement

The ethics committee approved the proposal at the College of Medicine, University of Sulaimani / Kurdistan Region / Iraq. After that, official permission was obtained from the Sulaimani General Directorate of Health. Consequently, permissions were obtained from the Hiwa Hospital and Shar Hospital. Data were collected on several variables for the purpose of this study. Participants were given detailed information regarding the aim and objectives of the study. They were asked for permission to use their answer.

Study Instrument

Based on the required information, the researcher designed a data collection questionnaire, including; sociodemographic characteristics, body mass index, clinical information, and food and dietary intakes per week. A food frequency questionnaire checked dietary food intake.

Data Collection

Data were collected through direct face-to-face interviews with the participants. The data was collected over seven months, from November 2021 to May 2022.

Statistical Analysis

The organized data were analyzed using Statistical Package for Social Sciences (SPSS) software program version 25.0. All of the data was presented in the appropriate tables and graphs. Frequency and percentages were calculated to describe the categorical variables. The Chi-square test was used to evaluate the relationship between different categorical variables. The Odds Ratio (OR) was calculated to assess the relationship between the various studied risk factors and the outcome. The present study's Probability value (P-value) level ≤ 0.05 is considered statistically significant.

Results

The age ranged from 22 to 91 years with a mean of 55.8, SD ± 16.14, and 20 - 87 years with a mean of 52.17, SD ± 13.9 for cases and controls, respectively. In both cases and controls, males constituted 52%, and females constituted 48% of the sample, giving a male-to-female ratio of 1.08:1.

Table (1). The higher percentage of cases (27%) was distributed in the age group of (61-70) years, and the higher percentage of control (38.5%) was in the age group of (51-60) years. 52% of participants were males. (80%) of cases and (94.5%) of controls were living in urban areas. (43%) of cases were house-wife, while (33%) of controls were employed. A higher percentage of cases and controls were married (87%, and 82%, respectively). Most cases were illiterate (39%), while most controls were university and post-graduated (29%). (68%) of cases had chronic diseases, while (58%) of the controls did not. (50%) of cases and (11.5%) of the controls had a positive family history of CRC. Most cases and controls were non-smokers (78%, and 80.5%, respectively). The higher proportion of cases and controls were non-drinker (93%, and 95%, respectively). The higher proportion of cases had normal weight (47%), while, the majority of controls had overweight (44%). There was a statistically significant difference between cases and controls regarding the; age groups, residency, educational level, chronic diseases, and family history of CRC, obese, and been overweight ($P < 0.001$, $P < 0.001$, $P = 0.011$, $P < 0.001$, $P < 0.001$, $P < 0.001$, and $P < 0.001$, respectively).

Table (2). In most of the cases, (44%) ate raw red meat more than seven times per week, and (52.5%) of controls ate (1 –2) times a week. (35%) of cases and (33%) of controls ate (5 – 7) times fruits and vegetables per week. A higher proportion of cases (31%) were drunk canned, sugar-sweetened, and carbonated beverages, while only (5.5%) of control consumed the mentioned juices and beverages.
There was a statistically significant difference between cases and controls regarding the frequency of consumption of; raw red meat, fruits and vegetables, sugar-sweetened juice, and carbonated beverages per week ($P < 0.001$, $P < 0.001$, $P < 0.001$, respectively).
Table (3). A multiple logistic regression analysis models, including all significant independent variables that might affect CRC development, was done to obtain the adjusted odd ratio in the final step. It revealed that eating raw red meat more than seven times per week was the first predictor of CRC with an adjusted OR of 18.739 ($P < 0.001$), and the second was drinking canned juice, sugar-

sweetened juice, and carbonated beverages (more than seven times) per week (adjusted OR = 15.846, P < 0.001). The third predictor was eating raw red meat (5 - 7) times per week (adjusted OR = 10.369, P = 0.012), and the fourth predictor was living in an urban (adjusted OR = 8.975, P < 0.001). The rest of the CRC predictors were (eating raw red meat (3 – 4) times per week, obesity, did not eat fruits and vegetables per week, having a family history of CRC, been overweight, drinking canned juice, sugar-sweetened juice, and carbonated beverages (3 – 4 times) per week, and illiteracy, respectively). These were the most significant independent predictors of CRC among the study participants.

Table (1) Sociodemographic characteristics of study participants

Variable	Categories	Cases		Controls		X^2 (P)
		N	%	N	%	
Age (Year)	20 – 30	5	5	14	7	21.2 (< 0.001)
	31 – 40	17	17	30	15	
	41 – 50	13	13	36	18	
	51 – 60	20	20	77	38.5	
	61 – 70	27	27	26	13	
	Above 70	18	18	17	8.5	
Mean ± SD		55.8 ± 16.14		52.17 ± 13.9		
Gender	Male	52	52	104	52	0.001 (1)
	Female	48	48	96	48	
Residency	Urban	80	80	189	94.5	15.12 (< 0.001)
	Rural	20	20	11	5.5	
Marital Status	Single	4	4	23	11.5	9 (0.085)
	Married	87	87	164	82	
	Divorced/Widowed	9	9	13	6.5	
Education Level	Illiterate	39	39	24	12	32.2 (< 0.001)
	Read And Write	7	7	24	12	
	Primary School	23	23	45	22.5	
	Secondary School	13	13	49	24.5	
	University And Post-Graduate	18	18	58	29	
	Illiterate	39	39	24	12	
Chronic Diseases	Yes	68	68	84	42	18.03 (< 0.001)
	No	32	32	116	58	
Family History Of CRC	Yes	50	50	23	11.5	53.70 (< 0.001)
	No	50	50	177	88.5	
Smoking	Yes	22	22	39	19.5	02.257 (0.612)
	No	78	78	161	80.5	
Alcohol Intake	Yes	7	7	10	5	0.499 (0.480)
	No	93	93	190	95	
Body Mass Index (BMI)	Normal	47	47	51	25.5	18.95 (< 0.001)
	Under Weight	3	3	1	0.5	
	Over Weight	33	33	88	44	
	Obesity	17	17	60	30	
Total		100	100	200	100	

N: number, %: percentage, P: P-value, X^2: Chi-square

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Table (2) Distribution of Food and Dietary Intake Habits Among Cases and Controls

Variable	Categories	Cases		Controls		X^2 (P)
		N	%	N	%	
Raw Red Meat Consumption / A Week	None	5	5	38	19	66.392 (< 0.001)
	(1-2) Times	27	27	105	52.5	
	(3-4) Times	14	14	26	13.3	
	(5-7) Times	10	10	17	8.5	
	More Than 7 Times	44	44	14	7	
Processed Meat / A Week	None	68	68	125	62.5	5.178 (0.270)
	(1-2) Times	17	17	53	26.5	
	(3-4) Times	7	7	14	7	
	(5-7) Times	5	5	4	2	
	More Than 7 Times	3	3	4	2	
Fruits And Vegetables / A Week	None	31	31	16	8	37.421 (< 0.001)
	(1-2) Times	17	17	31	15.5	
	(3-4) Times	10	10	35	17.5	
	(5-7) Times	35	35	66	33	
	More Than 7 Times	7	7	52	26	
Canned Juice, Sugar-Sweetened Juice, And Carbonated Beverages / A Week	None	32	32	103	51.5	51.726 (< 0.001)
	(1-2) Times	23	23	62	31	
	(3-4) Times	14	14	18	9	
	(5-7) Times	9	9	6	3	
	More Than 7 Times	31	31	11	5.5	
Fish / A Week	None	18	18	22	11	3.214 (0.754)
	(1-2) Times	34	34	91	40.5	
	(3-4) Times	24	24	27	13.5	
	(5-7) Times	12	12	10	5	
	More Than 7 Times	12	12	50	25	
Poultry / A Week	None	10	10	14	7	2.890 (0.576)
	(1-2) Times	29	29	56	28	
	(3-4) Times	30	30	53	26.5	
	(5-7) Times	22	22	61	30.5	
	More Than 7 Times	9	9	16	8	
Milk, Dairy Product	None	17	17	12	6	2.285 (0.664)
	(3-4) Times	15	15	16	8	

/ A Week	(5-7) Times	27	27	79	39.5	
	More Than 7 Times	20	20	37	18.5	
Total		100	100	200	100	

N: number, %: percentage, P: P-value, X^2: Chi-square

Table (3) Multiple Logistic Regression Analysis of Risk Factors of Colorectal Cancer

Variables	B	P - Value	Adjusted OR	95% CI For OR
Eating Raw Red Meat (More Than Seven Times) Per Week	2.931	(< 0.001)	18.739	3.343 – 105.30
Drinking Canned Juice, Sugar-Sweetened Juice, And Carbonated Beverages (More Than Seven Times) Per Week	2.763	(< 0.001)	15.846	4.009 – 62.631
Eating Raw Red Meat (5 - 7 Times) Per Week	2.339	(0.012)	10.369	1.669 – 64.438
Living In Urban	3.950	(< 0.001)	8.975	2.374 – 33.938
Eating Raw Red Meat (3 - 4 Times) Per Week	2.112	(0.045)	8.261	1.050 - 64.99
Obesity	2.023	(< 0.001)	7.564	2.297 – 24.908
Did Not Eat Fruits & Vegetables Per Week	1.917	(0.019)	6.798	1.374 – 33.620
Family History Of Colorectal Cancer	1.702	(< 0.001)	5.483	1.089 – 14.392
Over Weight	1.565	(0.002)	4.783	1.786 – 12.810
Drinking Canned Juice, Sugar-Sweetened Juice, And Carbonated Beverages (3 - 4 Times) Per Week	1.536	(0.023)	4.648	1.234 – 17.511
Illiteracy	1.216	(0.05)	3.374	1.912 – 10.481

B: regression coefficient, OR: Odds ratio CI: Confidence interval

Discussion

The present study was conducted to determine the risk factors of CRC, including sociodemographic characteristics, selected different food and dietary intakes with the different frequencies, and the risk of developing CRC. It was conducted on 300 participants (100 CRC patients and 200 controls).

The present study finding is in agreement with the many studies, as a higher proportion of cases were aged above 51 years and older. The risk of CRC increases dramatically after age 50, 90% of all CRCs

are diagnosed after age 50 (14). A systematic review conducted in Spain revealed that age is one of the main risk factors for CRC (15). The explanation for that may be because there is no screening program and a lack of awareness on behalf of the patients. Age was a risk factor, but it did not appear as predictor after multiple logistic regression analysis.

Consistently with the previous studies, the present study showed no statistically significant differences between cases and controls regarding gender (16, 17).

Consistency with a previous study, the present study finding showed that most cases were urban residents (18). Many factors may have a role in this reason. Living in urban areas is mainly related to physical inactivity because of the nature of work in the urban area, such as prolonged office sitting jobs and eating unhealthy foods such as fast foods and westernized dietary composition.

The present study finding is in agreement with the results of studies conducted in the United States of America that reported a higher proportion of the studied respondent were married (19).

In the present study, illiteracy was one of the predictors of CRC, with an adjusted OR of 3.374. The finding of this study is in agreement with a study conducted in German that found patients with CRC were more likely to have a lower level of education ($P < 0.001$) (20).

The present study finding agrees with the cohort study conducted in the USA, concluding that the risk of CRC in those with one affected first degree relatives is about twice that of those without an affected family member (21).

Regarding smoking and alcohol intake and the risk of CRC, different results were found in many studies. Some studies showed a significant association between smoking and the risk of CRC, while many others showed no significant association between smoking and the risk of CRC. The present study's finding contradicts the findings of a systematic review by Botteri et al. concluded that compared with never-smokers, the risk relative for CRC was 1.14 (CI = 1.10 - 1.18) for current smokers and 1.17 (CI = 1.15 - 1.20) for former smokers (22), While, the present study finding is in agreement with the finding of other studies that showed smoking was not associated with CRC (23, 24).

The present study's finding is in agreement with the finding of many studies that reported alcohol intake was not associated with CRC (23, 24), while it contradicts the finding of a study that compared alcohol drinkers with non-drinkers and concluded that higher alcohol intake significantly increased the risk of CRC (25). The explanation for the present study finding regarding smoking and alcohol intake may be due to the small number of studied participants being smokers and alcohol drinkers.

The present study's finding is in agreement with the results of many studies that showed that being overweight and obese was associated with increasing the risk of developing CRC, as a study by Soltani et al. conducted in Iran (37), and a systematic review conducted by Bardou et al. (36). After multivariate logistic regression analysis, being overweight, and obesity remains as a of the predictors of CRC.

The present study findings showed a statistically significant difference between cases and controls regarding the frequency of eating raw red meat in a week (P < 0.001). After multivariate logistic regression analysis, eating raw red meat remains one of the predictors of CRC according to different frequencies of intakes per week. The present study's finding agrees with many studies that reported a positive association between the consumption of red meat and CRC (26, 27). The exact mechanisms underlying the association between CRC risk and high red and processed meat intake are uncertain. Meat contains several constituents that could increase the risk of cancer. Cooking meat at high temperatures or charcoal grilling produces mutagens, polycyclic aromatic hydrocarbons, and carcinogens (heterocyclic amines and polycyclic aromatic hydrocarbons (28). According to guidelines, the recommended amount of red meat for healthy people is 500 g/week or 70 g/day (28).

The present study findings showed a statistically significant difference between cases and controls regarding the frequency of eating fruits and vegetables per week (P < 0.001). After multivariate logistic regression analysis, did not eat fruits and vegetables remains one of the predictors of CRC. The present study's finding is in agreement with the finding of many studies that reported the consumption of raw and cooked vegetables and raw fruits inversely associated with CRC risk (29, 30). The preventive effect of dietary fiber could be explained by biological mechanisms that include increasing amounts of feces, decreasing gastrointestinal transit time, and diluting intestinal cancer-causing factors.

The present study findings showed a statistically significant difference between cases and controls regarding the frequency of consumption of canned juice, sugar-sweetened juice, and carbonated beverages per week (P < 0.001). After multivariate logistic regression analysis, consumption of canned juice, sugar-sweetened juice, and carbonated beverages remains one of the predictors of CRC. The present study's finding is in agreement with the finding of a population-based case-control study conducted in Italy that showed the risk of CRC was increased nearly threefold for the highest level of consumption of foods with a high content of refined sugar (31).

The present study's finding contradicts the findings of other studies that found milk consumption was inversely associated with CRC risk (32, 33).

Consistency with the previous study, the present study findings showed no statistically significant difference between cases and controls regarding the consumption of poultry (P = 0.576) (29).

Consistency with the previous study, the present study findings showed that there was no statistically significant difference between cases and controls regarding the consumption of fish (P 0.570) (34), while another study reported that there was a negative association between consumption of fish and the risk of CRC (29).

The present study's finding contradicts other studies that concluded that a higher dietary intake of processed red meat was associated with a higher risk of CRC (27, 29). The chemicals used to preserve processed meat, such as nitrates and nitrites, might increase the exposure of the gut to mutagenic N-nitroso compounds. Both processed and unprocessed red meat also contain haem iron, which might

have a cytotoxic effect in the gut and increase the formation of N-nitroso compounds. Cooking meat at high temperatures can generate mutagenic heterocyclic amines and polycyclic aromatic hydrocarbons.

Consistent with previous studies, the present study findings showed no statistically significant differences between cases and controls regarding the consumption of whole grains (P = 0.575) (35).

Conclusion

There was a positive association between the risk of CRC and having a family history of CRC, living in urban areas, illiteracy, consumption of raw red meat, drinking canned juice, sugar-sweetened juice, and carbonated beverages, and did not eat fruits and vegetables.

Recommendation

Integrate a public health education program to raise awareness of CRC risk factors and the value of early detection in order to target high-risk populations. Raise awareness of the need to modify lifestyle to include a healthy diet, encourage physical activity, and maintain healthy body weight. Try to overcome or reduce illiteracy in the community.

Disclosure Statement

The authors report no conflict of interest.

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