International Journal of Applied Research

Aya Saad
Department of Nutrition,
Faculty of Public Health,
University of Benghazi,
Benghazi, Libya

Abtihal Ahmed
Department of Nutrition,
Faculty of Public Health,
University of Benghazi,
Benghazi, Libya

Esra Emad
Department of Nutrition,
Faculty of Public Health,
University of Benghazi,
Benghazi, Libya

Salima Elfagi
Department of Nutrition,
Faculty of Public Health,
University of Benghazi,
Benghazi, Libya

Nagwa Elmighrabi
School of Health and Society,
University of Wollongong,
Wollongong, Australia

Isam Danna
Department of community and
family medicine, faculty of
medicine, University of
Benghazi, Benghazi, Libya

Ali Ateia Elmabsout
Department of Nutrition,
Faculty of Public Health,
University of Benghazi,
Benghazi, Libya

Corresponding Author:
Ali Ateia Elmabsout
Department of Nutrition,
Faculty of Public Health,
University of Benghazi,
Benghazi, Libya

Clinical characteristics and nutritional status of patients with colorectal cancer

Aya Saad, Abtihal Ahmed, Esra Emad, Salima Elfagi, Nagwa Elmighrabi, Isam Danna and Ali Ateia Elmabsout

Abstract
Introduction: Colorectal cancer (CRC) is one of the most common cancers worldwide and the fourth most common cause of cancer-related death. Patients complications, diet and other lifestyle factors have a significant influence on developing colon cancer. The aim of this work was to study the clinical characteristics and nutritional status of patients with colorectal cancer.
Methods: This cross sectional study was conducted with colorectal cancer patients in oncology unit at Benghazi medical center on 88 patients in which 28 male and 50 female. The data collected through modified self-administrated questionnaire. Data was analyzed by either frequencies or by suing Chi-square for significant differences.
Results and Discussion: The study enrolled 88 oncology patients. The mean age was 52.6 ± 10.6 years. Eighty eight, out of (56.8%) of the patients were female. The most common ages affected significantly by cancer was those between 41-60 years old ($P < 0.05$). There were abnormal levels of hemoglobin, red blood cells, serum potassium and serum sodium and carcino embryionic antigen have been identified. Asthma was the most chronic disease reported (P= 0.000). Furthermore, The most common risk factors contributed to colorectal cancer found obesity (P= 0.000). In addition, there also found that patients experiences severe pains as first sign of cancer developed, constipation, loss appetite, lose weight, nausea and vomiting ($P < 0.05$). The two methods of cancer treatment significant found were Surgical remove of colorectal cancer (P= *0.000*) and chemotherapy (P= 0.*000*). High body mass index was determined and high risk for body fat distribution has been found by WHtR ($P < 0.05$). history of food intake was highly reported through largely consumed all food stuffs and food groups ($P < 0.05$).
Conclusion: There were a numbers of factors implicated in CRC include high WHtR, obesity abnormal levels of biochemical tests and patients participate in government jobs. Taken together, patients with colorectal cancer need routine monitoring to reduced cancer severity, progresses and for maintain their quality of life.

Keywords: Malnutrition, colorectal cancer, nutrition status, BMI, clinical characteristics

Introduction
Colorectal cancer (CRC) is one of the most common cancers worldwide [1], Development of cancer from the parts of large intestine is referred to as colorectal cancer [2]. Through the gender differences, colorectal cancer is the second most common cancer in women (9.2%) and the third in men (10%) [3]. although, the age standardized incidence rate of colorectal cancer found higher in men than in women [3]. Patients with sporadic colorectal cancer are confined to those above 50 years of age [4].
One of the causes of colorectal cancer is due to mutations in specific genes that can lead to the onset of colorectal cancer, as happens in other types of cancer [5]. Depending on the derivation of the mutation the colorectal carcinomas can be classified as sporadic, inherited and familial [6].
The risk factor for colorectal cancer include the age, inherent, personal history of colorectal cancer or inflammatory bowel disease, familial history [7]. There are also some other risk factors, which are related to lifestyle, dietary and physical activity habits [8]. A sedentary lifestyle related to the obesity, is another important risk factor for colorectal cancer [9]. Furthermore, increase risk of CRC is linked to both food intake and increased levels of visceral adipose tissue (VAT), which enhance hormonally active component of total body fat that can promote the development of colorectal cancer via secretion of proinflammatory

cytokines, which eventually modulate inflammatory markers in the colon and rectum, insulin resistance and metabolic enzymes such as adiponectin or lectin [10]. In regarding diet and life style, the epidemiological and scientific research reported that diet and other lifestyle factors have a implicated in the risk of developing colon cancer [11] However, scare data about the influence of diet and other lifestyle factors on the outcome of patients with established colon cancer is still not established [12, 13].

The data on colorectal cancer from clinical characteristics and nutritional status were very scarce in Libya, therefore the present work might going to highlighted some clinical, biochemical, chronic disease related to colorectal cancers and also nutritional and dietary risk factors.

The aim of this work was to study clinical characteristics and nutritional status of patients with colorectal cancer.

Materials and methods
Study Population
Patients in this cross sectional study were recruited from oncology wards at Benghazi medical center from Beginning of January to the end of March 2020. Eighty eight patients were enrolled in the study consisting of 38 male and 50 female with the age ranging from 27 – 85 years old.

Questionnaires
A self-administered questionnaire including diet and lifestyle habits was given to patients. As an amendment to the protocol, a survey of diet and lifestyle was activated after patients were enrolled; therefore, adherence with completion of the questionnaire and beginning of the final sample size of 88 patients for this work. To be included in these analyses patients self-compile the questionnaire, reported realistic signs, symptoms, complications, types of food intake that have less than 70 blank items (of 131) on the food frequency questionnaires.

Dietary Assessment
Patients in these analyses completed semi-quantitative modified food frequency questionnaires (SFFQ) developed, tested, and refined by. Schulze et al. [14]. The questionnaire included 131 food items.

Determination of Dietary Patterns
To identify dietary patterns, there was factor analysis to data from the SFFQ. Food items on the questionnaires were clustered into food stuffs and predefined food.

Anthropometric measurements
Weight was measurements on minimal cloths to nearest 0.1 kg and height was measured by measuring tapes to nearest 0.1 cm. BMI was calculated as described by WHO [15]. Waists, wrist, hip were also measured for calculate the risk of disease and fat distribution as described in [15].

Clinical characteristics and nutritional status
Clinical characteristics is include signs, symptoms, complication, patients suffering from chronic disease and types of treatments. While nutritionals status include anthropometric measurements, biochemical investigation, clinical examination and dietary history. For the clinical examination a part of nutritional status is a narrow term focusing of nutritional related disorder and disease whereas clinical characteristics very broad include nutritional and non-nutritional causes of disease.

Statistical analysis and ethics
Statistical analyses were conducted using Statistical Package for Social Science 23.0 (SPSS) statistics program. Statistical significance was set at $p < 0.05$. The descriptive analyses of the normally distributed variables were presented as mean and standard deviation. Categorical data was assessed using the Chi-square test or Fisher's exact test. The ethical approval was obtained from the local Ethical Commission of Benghazi medical center by formal consent.

Result
The data collected on 88 patients shown that the age of the patients ranging from 27 – 85 years old with mean ± SD is 52.6 ± 10.6. The age groups were shown highly significant those groups between 41-60 years old (P= 0.00) and those with age between 61-85 presented with less percentages (20.7%) and being least age groups between 27-40 years old (Table 1). For the gender distribution female have shown slightly higher than male 56.8% vs 43.2% (Table 2).

Table 1: Patients age distribution

		N	N %	P values
age	27-40	12	13.8%	
	41-60	57	65.5%	0.000
	61-85	18	20.7%	

Chi-square test was performed and significant at α< 0.05.

Table 2: Patients gender distribution

		N	N %
gender	male	38	43.2%
	female	50	56.8%
	Total	88	100.0%

More than 50% of the patients have participated in daily government work and 34.1% were unemployed. In regard the education levels, more than 50% of the patients have university levels whereas the remaining education levels shown almost similar trends (Table 3).

Table 3: Socioeconomics characteristic of the patients

		N	N %
job	Self-employments	13	14.8%
	Employee	45	51.1%
	unemployed	30	34.1%
	Total	88	100.0%
education	illiterate	15	17.0%
	Primary	10	11.4%
	secondary	17	19.3%
	University	46	52.3%
	Total	88	100.0%

The result of blood biochemical parameters from patients revealed that, colorectal cancer patients have low hemoglobin, red blood cells, serum potassium and serum sodium and high carcinoembryonic antigen levels (Table 4).

Table 4: Blood Biochemical investigations

	Mean ± SD
hemoglobin	10.50± 1.40
red blood cell	4.55± 1.6
white blood cell	7.69± 2
carcino emberionic antigen	29.01± 8
serum creatinine	0.65±0.4
serum potassium	3.40±1.7
serum sodium	117.86± 5.50

The self-reported complication from patients with colorectal cancer shown all chronic disease except asthma (P= 0.000) have had no statistical significant differences (Table 5).

Table 5: Most common self- reported chronic disease

		N	N %	P values
Cardiovascular disease	yes	7	8.0%	
	no	81	92.0%	
	Total	88	100.0%	
diabetes mellitus	yes	23	26.1%	
	no	65	73.9%	
	Total	88	100.0%	
hypertension	yes	22	25.0%	
	no	66	75.0%	
	Total	88	100.0%	
central nervous disease	yes	7	8.0%	
	no	81	92.0%	
	Total	88	100.0%	
other cancer	yes	15	17.0%	
	no	73	83.0%	
	Total	88	100.0%	
other disease	anemia	14	15.9%	
	asthma	64	72.7%	0.000
	no	10	11.4%	
	Total	88	100.0%	

Chi-square test was performed and significant at α< 0.05.

In the next step, colorectal risk factors have been also investigated. The most common risk factors contributed to colorectal cancer found no significant differences with exception of obesity (P= 0.000) (Table 6).

Table 6: Risk factors for colorectal cancer

Risk factors		N	N %	P values
obesity	yes	71	80.7%	0.000
	no	17	19.3%	
	Total	88	100.0%	
smoking	yes	17	19.3%	
	no	71	80.7%	
	Total	88	100.0%	
alcohol	yes	3	3.4%	
	no	85	96.6%	
	Total	88	100.0%	
ulcerative colitis	yes	15	17.0%	
	no	73	83.0%	
	Total	88	100.0%	
family history of colon cancer	yes	23	26.1%	
	no	65	73.9%	
	Total	88	100.0%	
family history of other cancer	yes	21	23.9%	
	no	67	76.1%	
	Total	88	100.0%	
physical activity	very active	14	15.9%	
	active	29	33.0%	
	low active	25	28.4%	
	sedentary	20	22.7%	
	Total	88	100.0%	

Chi-square test was performed and significant at α< 0.05.

In the table 7, the average time for colorectal onset was one year (54.5%) by which newly diagnosis patients. The patients have experiences severe pains as first sign of cancer developed. Constipation, loss appetite, lose weight and nausea and vomiting were found significantly increased (*P*< 0.05) (Table 7).

Table 7: Sign and symptoms of colorectal cancer

		N	N %	P values
the onset of disease	1 - 12 month	48	54.5%	
	2-3years	19	21.6%	
	4-5years	16	18.2%	
	6-7	5	5.7%	
	Total	88	100.0%	
the first symptom or sign	vomiting	19	21.6%	
	diarrhea with blood	8	9.1%	
	constipation	25	28.4%	
	sever pain	35	39.8%	
	others	1	1.1%	
	Total	88	100.0%	
constipation	yes	55	62.5%	0.01
	no	33	37.5%	
	Total	88	100.0%	0.83
blood in the stool	yes	45	51.1%	
	no	43	48.9%	
	Total	88	100.0%	
decrease in stool caliber (thickness) diarrhea	yes	29	33.0%	
	no	59	67.0%	
	Total	88	100.0%	
loss of appetite	yes	70	79.5%	0.000
	no	18	20.5%	
	Total	88	100.0%	
loss of weight	yes	81	92.0%	0.000
	no	7	8.0%	
	Total	88	100.0%	
nausea and vomiting	yes	56	63.6%	0.011
	no	32	36.4%	
	Total	88	100.0%	

Chi-square test was performed and significant at $\alpha < 0.05$.

Surgical remove of colorectal cancer were the most options for treatment ($P = 0.000$) and come in the next chemotherapy (P= 0.000) (Table 8).

Table 8: Methods of colorectal cancer treatments

		N	N %	P values
surgery	yes	71	80.7%	0.000
	no	17	19.3%	
	Total	88	100.0%	
radiation therapy	yes	20	22.7%	
	no	68	77.3%	
	Total	88	100.0%	
taken radiation therapy before surgery	yes	11	12.5%	
	no	77	87.5%	
	Total	88	100.0%	
taken radiation therapy after surgery	yes	7	8.0%	
	no	81	92.0%	
	Total	88	100.0%	
chemotherapy	yes	68	77.3%	0.000
	no	20	22.7%	
	Total	88	100.0%	
taken chemotherapy before surgery	yes	26	29.5%	
	no	62	70.5%	
	Total	88	100.0%	
taken chemotherapy after surgery	yes	56	63.6%	
	no	32	36.4%	
	Total	88	100.0%	
target therapy	yes	20	22.7%	
	no	68	77.3%	
	Total	88	100.0%	

Chi-square test was performed and significant at $\alpha < 0.05$.

The overall means± SD of the anthropometric measurements were listed in the table [9], by which all measurements with exceptions of waist hip ratio, wrist height ratio and BMI were increased, for net BMI and WhtR shown overweight, and W/H ratio shown moderate risk. Further classification of these measurements as shown in

table [10] were revealed the most common WHR was at low risk, WhtR have significant overweight and obesity ($P =$ 0.000) and BMI, (overweight and obesity) (P= 0.22) as 56%, 41. 65.5% and 53.3% respectively (Table 10).

Table 9: Anthropometric measurements

	Mean ±SD
weight	71.10± 8
height	165.90± 24
waist circumference	89.24± 9
hip circumference	99.97± 13
W/H ratio	0.88±0.3
wrist height ratio	0.54±0.1
wrist circumference	16.49± 3
body frame	10.21±3
ideal body weight	60.61±10
body mass index	25.65±7

Table 10: Anthropometric indices

		Count	Column N %	P values
waist hip ratio classification	high risk	32	35.6%	
	low risk	56	64.4%	
	Total	88	100.0%	
wrist high ratio classification	under weight	4	4.6%	
	normal weight	26	29.9%	
	over weight obesity	58	65.5%	0.000
	Total	88	100.0%	
body mass index classification	under weight	7	8.0%	
	healthy weight	35	39.8%	
	over weight obesity	46	52.3%	0.22
	Total	88	100.0%	

Chi-square test was performed and significant at α< 0.05.

The past history of food intake were also included which involved most common food items that consumed before the episodes of colorectal cancers (Table 11 A & B).

Table 11 A: Past food history intake

Food items		N	N %	P values
carbohydrate and starch	yes	87	98.9%	0.000
	no	1	1.1%	
	Total	88	100.0%	
legumes and nuts	yes	67	76.1%	0.00
	no	21	23.9%	
	Total	88	100.0%	
vegetable	yes	80	90.9%	0.000
	no	8	9.1%	
	Total	88	100.0%	
red meat	yes	83	94.3%	0.000
	no	5	5.7%	
	Total	88	100.0%	
poultry	yes	80	90.9%	0.000
	no	8	9.1%	
	Total	88	100.0%	
fish	yes	71	80.7%	0.000
	no	17	19.3%	
	Total	88	100.0%	
fruits	yes	80	90.9%	0.000
	no	8	9.1%	
	Total	88	100.0%	

Chi-square test was performed and significant at α< 0.05.

Table 11 B: Past food history intake

		N	N %	P values
carbonated juices	yes	64	72.7%	0.00
	no	24	27.3%	
	Total	88	100.0%	
soft juices	yes	67	76.1%	0.00
	no	21	23.9%	
	Total	88	100.0%	

milk and dairy product	yes	78	88.6%	0.000
	no	10	11.4%	
	Total	88	100.0%	
eggs	yes	76	86.4%	0.000
	no	12	13.6%	
	Total	88	100.0%	
condiments and spices	yes	66	75.0%	0.00
	no	22	25.0%	
	Total	88	100.0%	
fats	yes	64	72.7%	0.00
	no	24	27.3%	
	Total	88	100.0%	
canned food	yes	75	85.2%	0.00
	no	13	14.8%	
	Total	88	100.0%	
desserts and candies	yes	76	86.4%	0.000
	no	12	13.6%	
	Total	88	100.0%	
likes or dislikes food	yes	0	0.0%	
	no	88	100.0%	
	Total	88	100.0%	

Chi-square test was performed and significant at α< 0.05.

The history of food intake was taken to nearest time of the cancer onset, and found that all food stuffs and items consumed during the last one year shown significant consumed (*P*< 0.05). Table (12 A &B).

Table 12 A: Relation between food consumed and onset of cancer

Food items		the onset of disease		P values
		1 – 12 month		
		N	N %	
carbohydrate and starch	yes	47	97.9%	0.000
	no	1	2.1%	
	Total	48	100.0%	
legumes and nuts	yes	37	77.1%	0.00
	no	11	22.9%	
	Total	48	100.0%	
vegetable	yes	47	97.9%	0.000
	no	1	2.1%	
	Total	48	100.0%	
red meat	yes	46	95.8%	0.000
	no	2	4.2%	
	Total	48	100.0%	
poultry	yes	45	93.8%	0.000
	no	3	6.3%	
	Total	48	100.0%	
fish	yes	44	91.7%	0.000
	no	4	8.3%	
	Total	48	100.0%	
fruits	yes	46	95.8%	0.000
	no	2	4.2%	
	Total	48	100.0%	

Chi-square test was performed and significant at α< 0.05.

Table 12 B: Relation between food consumed and onset of cancer

Food items		The onset of disease		P values
		1 - 12 month		
		N	N %	
carbonated juices	yes	38	79.2%	0.00
	no	10	20.8%	
	Total	48	100.0%	
soft juices	yes	42	87.5%	0.000
	no	6	12.5%	
	Total	48	100.0%	
milk and dairy product	yes	44	91.7%	0.000
	no	4	8.3%	
	Total	48	100.0%	
eggs	yes	46	95.8%	0.000

	no	2	4.2%	
	Total	48	100.0%	
condiments and spices	yes	35	72.9%	0.00
	no	13	27.1%	
	Total	48	100.0%	
fats	yes	35	72.9%	0.00
	no	13	27.1%	
	Total	48	100.0%	
canned food	yes	40	83.3%	0.000
	no	8	16.7%	
	Total	48	100.0%	
desserts and candies	yes	44	91.7%	0.000
	no	4	8.3%	
	Total	48	100.0%	

Chi-square test was performed and significant at $\alpha < 0.05$.

Discussion

Diet and lifestyle play important role in the development of colorectal cancer, but the association is not yet understood.

The present work revealed that, the mean age of the patients were 52.6 ± 10.6 and the age significantly associated with cancer those between 41-60 years old (P= 0.000). The present study was inconsistent with the previous studies by Meyerhardt et al. [16] and Reedy et al. [17] On the other hands the works by Guenther et al. [18] shown that most age affected by colorectal cancer those 25-34 years old and aged less than 50 years old have been found by Siegel and colleagues [19] and Fung et al. [20]. For the gender distribution female have been shown slightly higher than male.

In regard socioeconomics characteristics, more than 50% of the patients have participated in daily government working, in which the public work could be more prone for developing of colorectal cancer, and the reason beyond that natural of the job and the present study did not mentioned details for the types of the jobs. In regard the education levels, more than 50% of the patients have university levels whereas the remaining education levels shown almost similar trends. The presences of high levels of education in the colorectal cancer patients was inconsistent with other study [21, 22].

The result of blood biochemical tests from patients revealed that, colorectal cancer patients have low hemoglobin, red blood cells, serum potassium and serum sodium and high carcino embryionic antigen (CEA) levels. The low levels of serum biochemical could be due to chemotherapy and high levels of CEA indicated whether cancer progress or failure of chemotherapy achievements. These finding were interest and according to our knowledge no studies confirmed that so far.

Among self-reported chronic disease by patients, the only disease found highly significant was asthma and this result was also first highlighted in the present work because the asthma was reported less common in number of researches [23-25]. Furthermore, among the risk factors contributed to the colorectal cancer development were genetic as well as environmental factors, such as high alcohol intake, cigarette smoking, high red meat and process food intake, low fruits and vegetable intakes, and also obesity and inactive life style [26-30]. However the current study did not find relation of those factors to colorectal cancer incidences except obesity (P< 0.000). This might be in part due to low small sample sizes. The most common sign and symptoms reported in the study were severe pains as first sign of cancer developed, constipation, loss appetite, lose weight,

nausea and vomiting were found significantly increased (P< 0.05). These signs and symptoms probably due to course of treatment or advance stages of cancer. Although, such symptoms were also established in [31-35].

The suggestive treatment of colorectal cancer are dependent on the stages, which include surgical, chemotherapy, radiotherapy and target therapy [36-40]. In spite, the present research shown that, both surgical and chemotherapy the only methods of treatment provided significantly to the patients (P< 0.05). This could be probably due to the availability of those methods.

To determine the further nutritional status of patients, the anthropometric measurement was performed which include BMI, WHR, and WHtR. Further classification of these measurements revealed the most common WHR was at low risk, while WhtR have significant overweight and obesity. However, BMI, found overweight and obesity. The overall BMI was similar to the study carried out by Järvinen et al [41] and Jennifer et al. [42], while WHtR has not been studied. According to our knowledge our study is the only study has highlighted this figure, the WHtR is parameter used to study distribution of adipose tissue [43].

The past food history of patients were undertaken to know the risk of dietary intake to the development of colorectal cancer. In the present study the history of food intake were studied for all patients over the last year because the only one year back could be closet and easiest time to take history of food consumption and linked to colorectal cancer and also found that over the last one year significantly differences among patients. unfortunately, the current work could not found any particular food linked to the colorectal cancer instead, the study found all food stuffs and items listed in the table (12 and 13) were highly consumed (P< 0.05). In several studies the dietary risk factors for colorectal cancer were found high red meat intake, process foods, low fruits and vegetable consumption, high fatty acids intake and also saturated fatty acids [44-47].

In sum, the data of the present study suggested that, the history of food intake should be documented once the colorectal cancer confirmed, and there were a numbers of new highlighted in the study which include high WHtR, abnormal levels of biochemical tests and patients participate in government jobs. Taken together, with risk factors aforementioned above could implicated in colorectal developments. This study need to be validity in large sample sizes. Its highly recommended that patients with Colorectal cancer need regular dietary monitoring in order to avoid development protein energy malnutrition and cachexia.

Conclusion

The current study revealed that colorectal cancer significantly affected age groups between 41-60 years old. Furthermore, female has been more prone to colorectal cancer than male. Approximately of 50% of patients have cancer-related government jobs and high graduated levels of educations. The present study demonstrated that patients with colorectal cancer have low serum levels of hemoglobin, red blood cells, serum potassium and serum sodium and high levels of CEA. The most common of chronic disease reported by patients was asthma. Furthermore, obesity was considered the only risk factors for development colorectal cancer and the majorities of signs and symptoms significantly experiences by patients have been linked to severe pains as first sign of cancer developed, constipation, loss appetite, lose weight, nausea and vomiting. Both surgical and chemotherapy the only methods of treatment colorectal cancer provided significantly to the patients. The anthropometric measurements of patients have been found that more than 50% of patients have BMI overweight and obesity and significantly have higher WHtR. the history of food intake shown that all food stuffs and food groups were highly consumed by patients.

The data of the present study suggested that, the history of food intake should be documented once the colorectal cancer confirmed, and there were a numbers of new highlighted in the study which include high WHtR, abnormal levels of biochemical tests and patients participate in government jobs. Taken together, with risk factors aforementioned above could implicated in colorectal developments.

Conflict of Interest

No conflict of interest.

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