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Gastrointestinal Cancer: Distribution, Nutritional Status, Dietary Habits, and Associated Factors among Patients in Benghazi, Libya

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Abstract:

Introduction
Gastrointestinal cancer refers to malignant conditions of the gastrointestinal tract (GI tract) and accessory organs of digestion. GIT cancer have multifactorial risk factors and complex etiology. This study aimed to investigate the associated factors, nutritional status, dietary habits and distribution of gastrointestinal cancer .
Methods
A case series method was used to collect data from patients with GIT cancer ages between 21-81 years. Data was collected in the month of October 2022 to May 2023 from Benghazi medical center. A specially designed questionnaire was used for data collection. A total 102 patients (70 females and 32 male) included in the study. The samples were analyzed by using SPSS version 23 through either mean ±SD or Chi-square for determination significant differences at $\alpha < 0.05$.
Result
The present study shown that GIT cancer increase in female age groups 41-60 years. Married women were most common have GIT cancer ($p=0.000$). In the present work, the distribution of GIT cancer as the following 49% colon cancer followed by 17.6% stomach cancer and small bowel (10.8%), rectum & liver 7% for each and esophagus 4%. Of 83% GIT cancer were malignancy with about 50% have positive family history. Anthropometric indices shown significant increase body weight (obesity), waist circumferences, WHR and large frame size ($p<0.05$). High fat intake, and salted foods were accounted as common risk factors. Imbalance diet include more junk and processed foods and physical inactivity highly contributed for GIT cancer. Diabetes and HTN were the most common complications reported.
Conclusion.
The present study demonstrated that significant increase of GIT cancer in female, in middle ages. Colon cancer was the common one. Higher anthropometric indices, positive family history, high fat intake, high salt intake contributed for increase GIT cancer. Unbalances food intake and physical inactive patients contributed for high risk for GIT cancer.

Keywords: Associated factors, gender, ages, GIT, family history, anthropometric, dietary intake, nutritional status

1. Introduction

Gastrointestinal (GI) cancers represent a major global health problem and include malignancies arising from the esophagus, stomach, small intestine, colorectum, liver, and other organs of the digestive system. Collectively, these cancers contribute substantially to cancer incidence and mortality worldwide and constitute an important burden on healthcare systems. According to the International Agency for Research on Cancer (IARC) GLOBOCAN 2022 estimates, approximately 20 million new cancer cases and 9.7 million cancer-related deaths occurred globally in 2022. Among the most frequently diagnosed cancers were colorectal and stomach cancers, while colorectal, liver, and

stomach cancers were also among the leading causes of cancer mortality. The global cancer burden is expected to increase considerably in the coming decades, particularly in countries undergoing demographic and epidemiological transitions [1].

The distribution of gastrointestinal cancers varies according to age, sex, geographic region, genetic susceptibility, socioeconomic conditions, and environmental and lifestyle exposures. Increasing age is one of the most important determinants of cancer occurrence, although changes in lifestyle and metabolic factors have also contributed to the burden of gastrointestinal malignancies. In particular, colorectal cancer has become a major public health concern because of its high incidence and mortality and its association with potentially modifiable factors such as excess body weight, physical inactivity, smoking, and dietary behaviors [1,2].

Diet is considered an important component of the complex interaction between lifestyle and gastrointestinal cancer. Dietary patterns characterized by high consumption of red and processed meat, foods high in fat, salt, sugar, and energy, and highly processed foods have been associated with unfavorable health outcomes and may contribute to the development of some gastrointestinal malignancies. In contrast, diets rich in whole grains, dietary fiber, fruits, vegetables, and legumes are generally associated with a more favorable cancer-prevention profile. The World Cancer Research Fund reports strong evidence that consumption of processed meat increases the risk of colorectal cancer, while red meat is probably a cause of colorectal cancer. In addition, inadequate consumption of fiber-rich foods and excess body weight are recognized as important factors associated with colorectal cancer risk [3,4].

Body composition and nutritional status are particularly important among patients who have already developed gastrointestinal cancer. Cancer itself, together with tumor location, disease stage, systemic inflammation, treatment-related adverse effects, and reduced food intake, can substantially alter nutritional status. Patients with gastrointestinal malignancies may experience weight loss, anorexia, gastrointestinal symptoms, impaired nutrient intake, and changes in metabolism. Consequently, malnutrition and changes in body composition may occur even in patients who do not appear underweight. Nutritional impairment may adversely affect physical function, tolerance to anticancer treatment, quality of life, and clinical outcomes [5,6].

At the same time, nutritional problems among cancer patients are not limited to undernutrition. Overweight and obesity are increasingly recognized as important components of the cancer burden. Excess body weight is associated with several malignancies, including colorectal cancer, and may coexist with metabolic disorders such as diabetes mellitus and hypertension. Dietary patterns characterized by high-energy foods, excessive fat, refined carbohydrates, sugar-sweetened beverages, and other highly processed foods can contribute to excessive energy intake and weight gain. Therefore, assessment of body mass index (BMI), waist circumference, waist-to-hip ratio (WHR), recent weight changes, and dietary practices can provide valuable information about the nutritional and metabolic characteristics of patients with gastrointestinal cancer [3,4].

Cancer treatment may further influence patients' nutritional behavior and food choices. Chemotherapy and radiotherapy can produce symptoms such as nausea, vomiting, altered taste, appetite changes, gastrointestinal disturbances, and fatigue, which may modify dietary intake. Conversely, some patients may voluntarily change their diet following diagnosis by reducing consumption of red meat, fatty foods, sweets, soft drinks, canned foods, or other foods perceived to be harmful, while increasing consumption of fruits and vegetables. Assessment of dietary practices before and after cancer diagnosis may therefore provide useful insight into changes in patients' food-related behaviors and nutritional management during the disease course. Current clinical nutrition recommendations emphasize early identification of nutritional problems and individualized nutritional support throughout cancer treatment [5].

In addition to dietary factors, gastrointestinal cancer is influenced by a broad range of behavioral, metabolic, infectious, and sociodemographic factors. Smoking, physical inactivity, obesity, diabetes, *Helicobacter pylori* infection, and family history may contribute to the risk profile of specific gastrointestinal cancers. However, the importance of these factors differs according to the anatomical site and type of cancer. Therefore, evaluating the distribution of cancer types together with patients' demographic characteristics, medical history, anthropometric measurements, dietary practices, physical activity, and treatment characteristics is important for understanding the clinical and nutritional profile of affected populations [1,3,4].

In Libya, locally generated information regarding the nutritional and lifestyle characteristics of patients with gastrointestinal cancer remains important for developing appropriate cancer prevention, nutritional assessment, and supportive-care strategies. Differences in dietary patterns, socioeconomic circumstances, healthcare access, and

population characteristics mean that findings from other countries cannot necessarily be directly generalized to the Libyan population. In particular, information describing the distribution of gastrointestinal cancer types alongside nutritional status, dietary habits, anthropometric characteristics, physical activity, and associated medical and lifestyle factors among patients in Benghazi is valuable for establishing a local evidence base.

Therefore, the present study was undertaken to assess the nutritional and anthropometric status, dietary habits, physical activity, treatment characteristics, and some associated factors among patients with gastrointestinal cancer.

2. Materials and methods

Study population

A case series study carried out from October 2022 to May 2023 in oncology department on patients with GIT cancer in Benghazi, second largest city in Libya.

Approached of our study is aged groups attending the Benghazi medical center. The samples 102 subjects (32 male and 70 female) and the age of patients between 21-81 years were involved in the study. After obtaining written consent, the subjects were requested to fill out a questionnaire and proceed to a private area to have their height and weight measured. Although we approached different number of subjects and the final completed questionnaires in hand were 102. Hence, our overall response rate was 99%.

Questionnaire design.

The questionnaire for this study based on 36 items divided into four sections. It contained questions about personal information, demographic and socioeconomic characteristics, physical activity and personal habit, family history of cancer, type of cancer, biochemical investigations, history of disease and types of foods intake.

Measurements.

Weight and height were measured after completion of the questionnaires and hand in by two students. Height was measured to the nearest 0.1 cm using standard calibrated scale attached to the balance against a wall. Weight was measured to the nearest 0.2 kg using weighing machine. All measurements were collected with participants in either thin socks or barefoot and with heavy clothing items taken away. Body mass index (BMI) was computed as weight in kilograms divided by the square of height in meters and categorized according to the World Health organization (7). WC was measured at the narrowest level and that of the hip at the maximum level over light clothing, using an unstretched tape meter, without any pressure to body surface and measurements were recorded to the nearest 0.1 cm. WHR was calculated as WC divided by hip circumference. To avoid subjective error, all measurements were taken by the same person.

With the waist-to-hip ratio the WHO defines the ratios of >9.0 in men and >8.5 in women as one of the decisive benchmarks for metabolic syndrome. A waist circumference >35 inches (88 cm) in women and >40 inches (102 cm) in men (8).

Biochemical tests.

The laboratory tests were obtained include testing of hemoglobin, RBC, MCV, WBC, cancer biomarkers and lipid profiles. Data were collected by semi-structured interviews and from medical records of patients.

Ethical statement

This study was granted approval by the local Ethics Committee of the Benghazi province. Informed written consent was obtained through a consent form that was given to the participants along with the questionnaire.

Statistical analysis

The data from the questionnaires was entered using Excel. Data set was exported to SPSS v.23 and Epi-info for complete analysis. Statistical analysis was carried out for the complete sample which were created according to measured BMI: underweight, normal and overweight. Mean values and standard error of meam for all continuous variables: weight, height, BMI, age, genders and other variables for all groups were obtained. Frequencies for each categorical variable were calculated for each group as well. To determine the differences regarding each categorical variable in the groups, Chi-square test was performed.

3. Result

Table (1) shown that, female patients were twice the male 68.6% and 31.4% respectively. GIT cancer was significant increase in female (p=0.000)

Table 1: Gender distribution of patients:

Gender		N	Percentages %	P values
	Male	32	31.4%	
	Female	70	68.6%	0.000
	Total	102	100.0%	

The age of participants were ranging from 21-81 years with an average age 51 years old. There were statistically significant increase of cancer in age groups 41-60 years old (p=0.000) (Table 2).

Table 2: Age distribution of patients:

Age (year)	N	Percentages %	*P values
21-25	4	3.9%	
26-40	18	17.6%	
41-60	65	63.7%	0.000
60-81	15	14.7%	
Total	102	100.0%	

*Significant at α<0.05 by Chi-square test.

Socioeconomics characteristics of patients shown that, the majorities of cancer patients and significant increase were married (79.4%) (p=0.000). Unemployment of the patients were represented the highest percentages 51% (Table 3)

Table 3: Socioeconomics characteristics:

Characteristics		No	Percentages %	*P values
marital status	Single	10	9.8%	
	Married	81	79.4%	0.000
	Divorced	9	8.8%	
	Widow	2	2.0%	
	Total	102	100.0%	
Level of education.	Illiterate	25	24.5%	
	Primary	22	21.6%	
	Secondary	22	21.6%	
	University	33	32.4%	0.09
	Total	102	100.0%	
current job	Private	12	11.8%	
	Governments	38	37.2%	
	Unemployment	51	51.0%	0.05
	Total	102	100.0%	
	No job	51	50.0%	
job duration	<3 hr.	7	6.9%	
	3-5 hr.	30	29.4%	0.08
	6-10 hr.	12	11.7%	

	>10 hr.	3	2.9%	
	Total	102	100.0%	

*Significant at $\alpha<0.05$ by Chi-square test.

About 50% of GIT cancer were confined to colon cancer followed by 17.6% stomach cancer and small bowel (10.8%). The majorities of patients' cancer stages were stage 1 (38.2%). The duration of cancer shown 46.1% were recently develop (less than 1 year). All the cancers reported in the study found to be malignancy (83.3%) (p=0.000). Family history did not affect cancer develop but colon cancer shown increased linked to family history (data not significant) (Table 4).

Table 4: Medical history of GIT cancer:

Characteristics		N	Percentages %	*P values
Types of GIT cancer	Oral	1	1.0%	
	Esophagus	4	3.9%	
	stomach	18	17.6%	
	Stomach and colon	1	1.0%	
	Small bowel	11	10.8%	
	Small bowel and colon	1	1.0%	
	Small bowel and liver	1	1.0%	
	colon	50	49.0%	0.00
	Colon and rectum	1	1.0%	
	rectum	7	6.9%	
	liver	7	6.9%	
	Total	102	100.0%	
Stages of cancer	No know	23	22.5%	
	1	39	38.2%	0.09

	2	28	27.5%	
	3	6	5.9%	
	4	6	5.9%	
	Total	102	100.0%	
Duration of cancer (in year)	<1	47	46.1%	0.04
	1-2	31	30.4%	
	2-3	13	12.7%	
	3-4	2	2.0%	
	4-5	3	2.9%	
	>6	6	5.9%	
	Total	102	100.0%	
diagnosis	Benign	17	16.7%	
	malignancy	85	83.3%	0.000
	Total	102	100.0%	
family history	No	57	55.9%	0.01
	oral	1	1.0%	
	Esophagus	2	2.0%	
	stomach	8	7.8%	
	Stomach and liver	2	2.0%	
	Small bowel	4	3.9%	
	colon	21	18.7%	
	rectum	5	4.9%	
	Rectum and liver	1	1.0%	

liver	3	2.9%	
Total	102	100.0%	

*Significant at $\alpha<0.05$ by Chi-square test.

All types of GIT cancer with exception of Esophagus cancer increased in female. Furthermore, colon cancer shown significant increase (p=0.04) Table (5).

Table 5: gender and type of GIT cancer:

Type of GIT cancer	gender				*P values
	Male		Female		
	N	Percentages %	N	Percentages %	
Oral	0	.0%	1	1.4%	
Esophagus	2	6.2%	2	2.9%	
Stomach	6	18.8%	12	17.1%	
Stomach and colon	0	.0%	1	1.4%	
Small bowel	4	12.5%	7	10.0%	
Small bowel and colon	0	.0%	1	1.4%	
Small bowel and liver	0	.0%	1	1.4%	
colon	18	56.2%	32	45.7%	0.04
Colon and rectum	0	.0%	1	1.4%	
Rectum	2	6.2%	5	7.1%	
liver	0	.0%	7	10.0%	
Total	32	100.0%	70	100.0%	

*Significant at α<0.05 by Chi-square test.

In table (6 A), there were heavier body weight with high risk of waist circumferences and hip waist ratio, and graduate weight loss has been identified in patients. Because of the high mean of BMI among the patients we further investigated body mass index categories to clarified high BMI whether obese or overweight. Table (6B) shown that significantly increase by which more than 60% of patients were overweight and obesity (p=0.01). The other anthropometric indices include frame size and WHR categories the most patients involved in the study were have significant large frame size and high risk of WHR (p=0.000) (Table 6 C).

Table 6A: Anthropometric measurements of patients:

Character	Mean± SEM
BMI	27±1
waist	98±2
HR	9.8±3
WHR	112.24±3.80
Current weight	75±4
Weight in last month	63±3
Weight in last 6 months	70±3

Table 6 B: Body mass index categories in patients:

BMI categories	N	Percentage %	*P values
Underweight	13	12.7%	
normal	25	24.5%	
overweight	25	24.5%	0.01
obese	39	38.2%	0.08
Total	102	100.0%	

*Significant at α<0.05 by Chi-square test.

Table 6 C: Anthropometric indices for patients

Anthropometrics		N	Percentages %	*P values
Frame size	large	54	52.9%	0.000
	medium	28	27.5%	
	small	20	19.6%	
	Total	102	100.0%	
WHR categories	Low risk	18	17.6%	
	Moderate risk	18	17.6%	
	High risk	66	64.7%	0.000
	Total	102	100.0%	

* Significant at α<0.05 by Chi-square test.

Through the treatment regimen of patients, the present result found that, 83.2% of patients receiving chemotherapy for treatments and significantly they did not follow any adherence diets (p=0.000) Table (7).

Table 7: Treatment regimen and adherence patient diet

Characteristics		N	Percentages %	*P values
treatment, 1=radiation, 2=chemotherapy	Irradiation	16	16.8%	
	chemotherapy	85	83.2%	
	Total	102	100.0%	
strict diet	Yes	14	13.7%	
	No	88	86.3%	0.000

Total	102	100.0%	

*Significant at α<0.05 by Chi-square test.

High fat intake was the most common associated factors significantly attributed in developing of GIT cancer (35.25%) (p=0.03) followed by history of heavier body weight status (20.25%).Both DM and hypertension represent the highest percentages of complication among the patients (38.94% and 25.43% respectively) (Table 8).

Table 8: Association factors and most common complication:

Characteristics		Percentage %	*P values
Associated factors	Helicobacter Pylori	10.4%	
	Smoking	9.25%	
	High fat intake	35.25%	0.03
	ulcer	7.3%	
	History of obesity	20.25%	
	Salted diet	17.63%	
	Total	100.0%	
Complication/ chronic diseases	CVD	6.1%	
	HTN	25.43%	
	DM	38.94%	0.02
	Kidney disease	4.40%	
	osteoarthritis	10.7%	
	Retinopathy	7.0%	
	Food allergy	4.40%	
	Total	100.0%	

*Significant at α<0.05 by Chi-square test.

In regard meals serving per day, the table (9A) below shown three times serving per days were significant increase in patients (p=0.000) while snacks per days did not reflex balance foods intake. Physical activities have been found play critical role in cancer develop (p<0.05). GIT cancer is well-known multifactorial risk factors therefore in the present work we investigated if type of food intake play a role in cancer developing. In the table (9B) we investigated patients food attitude before and after disease onset. We found certain foods were highly consumed before the onset of cancer include all foods groups except fish (p<0.05) but the after of cancer onset the patients attitude toward such foods changes by which decreased significantly include meat but fruits, vegetables marked increased. However, the other foods groups include cereals and legumes no or slightly changes. Empty caloric foods (junk food, beverages, canned foods and confectionary) were shown significantly consumed by patients before the onset of cancer. Furthermore such foods food dramatically decreased consumption by patients after onset of cancer (p=0.00). In addition, there were also other foods noticed be consumed significantly before the onset of cancer include tea, coffee, and crackers but some of this food were not changed in consumption after cancer onset with exception of crackers significantly decreased (p=0.000) (Table 9 B-E)

Table 9A: Meal practicing, and physical activities:

Characteristics		N	Percentages %	*P values
meals/day	1	2	2.0%	
	2	16	15.7%	
	3	77	75.5%	0.000
	4	7	6.9%	
	Total	102	100.0%	
Snacks	1	25	24.5%	
	2	43	42.1%	
	3	27	26.5%	
	4	7	6.9%	
	Total	102	100.0%	
Eating fast foods	Yes	28	27.5%	
	No	74	72.5%	
	Total	102	100.0%	
	No	75	73.5%	0.000

exercise	Daily	17	16.7%	
	Once weekly	7	6.9%	
	Twice a week	2	2.0%	
	Three a week	1	1.0%	
	Total	102	100.0%	

*Significant at $\alpha<0.05$ by Chi-square test.

Table 9 B: Food intake attitude before and after onset of cancer:

Food intake before and after onset of cancer		N	Percentages %	*P values
red meat before	Yes	86	84.3%	0.000
	No	16	15.7%	
	Total	102	100.0%	
red meat after	Yes	40	39.2%	
	No	62	60.8%	0.02
	Total	102	100.0%	
fish before	Yes	52	51.0%	
	No	50	49.0%	
	Total	102	100.0%	
fish after	Yes	59	57.8%	
	No	43	42.2%	
	Total	102	100.0%	
poultry before	Yes	99	97.1%	0.000

	No	3	2.9%	
	Total	102	100.0%	
poultry after	Yes	96	94.1%	
	No	6	5.9%	
	Total	102	100.0%	
dairy products before	Yes	93	91.2%	0.000
	No	9	8.8%	
	Total	102	100.0%	
dairy products after	1	88	86.3%	
	2	14	13.7%	
	Total	102	100.0%	

*Significant at $\alpha<0.05$ by Chi-square test.

Table 9 C: Food intake attitude before and after onset of cancer:

Food intake before and after onset of cancer		N	Percentages %	*P values
fruits before	Yes	67	65.7%	0.00
	No	35	34.3%	
	Total	102	100.0%	
fruits after	Yes	98	96.1%	0.000
	No	4	3.9%	
	Total	102	100.0%	
vegetables before	Yes	73	71.6%	0.00

	No	29	28.4%	
	Total	102	100.0%	
vegetables after	Yes	96	94.1%	0.000
	No	6	5.9%	
	Total	102	100.0%	
legumes before	Yes	66	64.7%	0.003
	No	36	35.3%	
	Total	102	100.0%	
legumes after	Yes	54	52.9%	
	No	48	47.1%	
	Total	102	100.0%	
cereal before	Yes	69	67.6%	0.00
	No	33	32.4%	
	Total	102	100.0%	
cereal after	yes	64	62.7%	0.010
	No	38	37.3%	
	Total	102	100.0%	

*Significant at $\alpha<0.05$ by Chi-square test.

Table 9 D: Food intake attitude before and after onset of cancer:

Food intake before and after onset of cancer		N	Percentages %	*P values
sweets before	Yes	93	91.2%	0.000
	No	9	8.8%	
	Total	102	100.0%	
sweets after	Yes	45	44.1%	
	No	57	55.9%	
	Total	102	100.0%	
beverages soft juices carbonated before	Yes	86	84.3%	0.000
	No	16	15.7%	
	Total	102	100.0%	
beverages soft juices carbonated after	Yes	25	24.5%	
	No	77	75.5%	0.000
	Total	102	100.0%	
canned before	Yes	77	75.5%	0.000
	No	25	24.5%	
	Total	102	100.0%	
canned after	Yes	32	31.4%	
	No	70	68.6%	0.000
	Total	102	100.0%	
fatty before	Yes	86	84.3%	0.000
	No	16	15.7%	

	Total	102	100.0%	
fatty after	Yes	31	30.4%	
	No	71	69.6%	0.001
	Total	102	100.0%	
salted food before	Yes	55	53.9%	
	No	47	46.1%	
	Total	102	100.0%	
salted food after	Yes	18	17.7%	
	No	84	82.3%	0.000
	Total	102	100.0%	

Table 9 E: Food intake attitude before and after onset of cancer:

Food intake before and after onset of cancer		N	Percentages %	P values
tea before	Yes	90	88.2%	0.000
	No	12	11.8%	
	Total	102	100.0%	
tea after	Yes	71	69.6%	
	No	31	30.4%	
	Total	102	100.0%	
coffee before	Yes	84	82.4%	0.000
	No	18	17.6%	
	Total	102	100.0%	
coffee after	Yes	53	52.0%	

	No	49	48.0%	
	Total	102	100.0%	
cracks before	Yes	64	62.7%	0.01
	No	38	37.3%	
	Total	102	100.0%	
cracks after	Yes	31	30.4%	
	No	71	69.6%	0.000
	Total	102	100.0%	

*Significant at $\alpha<0.05$ by Chi-square test.

4. Discussion

The gastrointestinal (GI) tract and accessory digestive organs, including the liver, pancreas, and gallbladder, account for a substantial proportion of the global cancer burden. Gastrointestinal cancers comprise several anatomically and biologically distinct malignancies, and their incidence and mortality show considerable geographic variation. Colorectal, stomach, and liver cancers are among the major contributors to global cancer incidence and cancer-related mortality, emphasizing the importance of understanding their distribution and associated risk factors at the population level [9,10]. The geographic variation observed in gastrointestinal cancer patterns may reflect differences in genetic susceptibility, environmental exposures, dietary practices, infection, socioeconomic conditions, healthcare access, and lifestyle behaviors [9,10]. Therefore, the present study was undertaken to describe the distribution and selected nutritional, dietary, anthropometric, and lifestyle characteristics of patients with gastrointestinal cancer in Benghazi, Libya.

In the present study, 102 patients with gastrointestinal cancer were included, comprising 32 males and 70 females, with ages ranging from 21 to 81 years and a mean age of approximately 51 years. A significantly higher proportion of female patients was observed compared with males ($p<0.001$). This finding is noteworthy because most epidemiological studies of colorectal cancer have generally reported higher incidence and mortality among males than females [11,12]. However, sex differences vary according to the anatomical site and biological characteristics of the tumor. Women may have different tumor distributions and molecular characteristics compared with men, and hormonal, metabolic, behavioral, and environmental factors may contribute to these differences [11-13]. Therefore, the predominance of females in the present sample should be interpreted as a characteristic of the studied population rather than evidence that female sex independently increases the risk of gastrointestinal cancer. Further population-based studies in Benghazi are needed to determine whether the observed female predominance reflects the actual epidemiological distribution of gastrointestinal cancers in the city.

Regarding age, the present study demonstrated a significant concentration of gastrointestinal cancer cases among patients aged 41–60 years ($p<0.001$). This finding is consistent with the established relationship between increasing age and cancer occurrence, although gastrointestinal cancers can occur at younger ages. Global cancer statistics demonstrate that the incidence of most major cancers increases substantially with advancing age [9]. The increasing burden of gastrointestinal malignancies among middle-aged and older adults may reflect cumulative exposure to environmental and lifestyle risk factors, genetic alterations, metabolic changes, and prolonged exposure to chronic inflammatory or infectious conditions. Nevertheless, because the present study included only patients with gastrointestinal cancer, the age distribution should be interpreted as the age profile of the studied patients rather than as evidence of age-specific cancer risk.

Interestingly, married participants represented the largest proportion of the study population (79.4%, $p<0.001$). This observation has not been consistently established as a biological risk factor for gastrointestinal cancer. Marital status is a complex socioeconomic and demographic characteristic that may be associated with age, household structure, healthcare-seeking behavior, socioeconomic circumstances, and access to medical services. Therefore, the high proportion of married patients in the present study should not be interpreted as evidence that marriage itself increases gastrointestinal cancer risk. In addition, the hypothesis concerning hormonal imbalance among married patients requires independent biochemical or hormonal investigation and cannot be established from the present data.

The present study demonstrated that approximately half of the gastrointestinal cancers were classified as colon cancer (49.0%), followed by stomach cancer (17.6%) and small-bowel cancer (10.8%). Colorectal cancer is among the most commonly diagnosed cancers worldwide and represents a major contributor to cancer-related mortality [9]. The predominance of colon cancer in the present study is therefore consistent with the substantial global burden of colorectal malignancy. However, the proportion observed in this study should not be directly interpreted as the population incidence of colon cancer in Benghazi because the sample consisted of patients included according to the study's eligibility criteria.

In contrast to much of the international literature, the present study observed a higher proportion of colon cancer among females than males, with a statistically significant association between sex and colon cancer ($p=0.04$). Large epidemiological studies generally report higher colorectal cancer incidence and mortality among males than females [11,12]. However, sex-related differences in colorectal cancer are complex and may involve differences in tumor location, molecular characteristics, lifestyle exposures, screening, body composition, and sex hormones [11-13]. Estrogen signaling has been proposed as one possible biological mechanism contributing to sex differences in colorectal cancer, although the evidence regarding circulating endogenous sex hormones and colorectal cancer risk remains inconsistent [13,14]. Consequently, the female predominance of colon cancer observed in the present study requires confirmation using larger population-based studies in Libya.

Small-bowel cancer accounted for approximately one-tenth of the gastrointestinal cancers in the present sample. This proportion appears higher than that generally reported internationally. Small-bowel cancers are relatively uncommon and have been estimated to account for approximately 3% of gastrointestinal malignancies [15]. The relatively high proportion observed in the present study may therefore reflect the small sample size, referral patterns, case selection, or the characteristics of the study center rather than a true population-level increase in small-bowel cancer in Benghazi. Larger multicenter studies and cancer-registry data would be required to investigate this observation.

Stomach cancer was the second most frequent gastrointestinal cancer in the present study, accounting for 17.6% of cases. Globally, stomach cancer remains one of the major causes of cancer incidence and mortality [9]. Its distribution is influenced by several factors, including *Helicobacter pylori* infection, dietary exposures, smoking, socioeconomic conditions, and other environmental factors. The identification of stomach cancer as one of the major cancer types in the present study emphasizes the importance of continued investigation of modifiable and infectious risk factors in the Libyan population.

Regarding disease stage, stage I was the most frequently reported stage, accounting for 38.2% of patients, whereas 22.5% of participants had an unknown stage. Almost half of the patients (46.1%) reported that their cancer had been diagnosed within the previous year. In addition, 83.3% of cases were classified as malignant. These findings provide an overview of the clinical characteristics of the study population. However, the relatively high proportion of patients with an unknown stage highlights the importance of complete documentation of tumor stage in future research, as stage is a major determinant of prognosis and treatment selection.

Family history was not significantly associated with the overall distribution of gastrointestinal cancer in the present study. Nevertheless, colon cancer appeared relatively frequent among patients reporting a family history. Family history is an established component of colorectal cancer risk, particularly when first-degree relatives are affected or when cancers occur at a young age. However, the absence of statistical significance in the present study may be related to the relatively small sample size and the heterogeneous types of gastrointestinal cancer included. Therefore, larger studies should investigate family history according to individual cancer site and degree of familial relationship.

Anthropometric findings demonstrated relatively high body weight, waist circumference, and waist-to-hip ratio among the participants. Furthermore, 24.5% of patients were overweight and 38.2% were obese, indicating that more than 60% of the participants had excess body weight. A high waist-to-hip ratio and large frame size were also frequently

observed. These findings are clinically important because excess body weight and central adiposity are recognized as modifiable factors associated with several cancers, including colorectal and other gastrointestinal malignancies [16,17]. However, because the current study did not include a non-cancer control group, the anthropometric findings should be described as characteristics of the cancer patients rather than interpreted as independent causes of gastrointestinal cancer.

The present study also identified high-fat food consumption as the most frequently reported dietary factor (35.25%), followed by a history of obesity (20.25%) and salted-food consumption (17.63%). Previous evidence has linked excess body weight, unhealthy dietary patterns, high consumption of red and processed meat, salt and salted foods, and physical inactivity with increased cancer risk [16-18]. In particular, dietary factors may influence gastrointestinal carcinogenesis through multiple mechanisms, including excess energy intake, obesity, metabolic dysfunction, inflammation, and exposure to potentially carcinogenic compounds. Nevertheless, the findings from the current study indicate the prevalence of these characteristics among the participants and do not establish a causal relationship with cancer development.

Physical inactivity was also common in the present study, with approximately 73% of participants reporting no regular exercise. Physical inactivity and excess body weight are recognized modifiable factors in cancer prevention. Evidence indicates that regular physical activity is associated with a lower risk of several cancers, while sedentary behavior and excess adiposity may contribute to an unfavorable metabolic environment [16,17]. The high prevalence of physical inactivity and excess body weight observed in this study therefore suggests an important area for preventive health education among the studied population.

Diabetes mellitus and hypertension were the most frequently reported chronic diseases among the participants, accounting for 38.94% and 25.43%, respectively. The coexistence of metabolic disorders and gastrointestinal cancer may reflect shared risk factors such as obesity, physical inactivity, unhealthy dietary patterns, and metabolic dysfunction. Previous research has reported associations between metabolic disorders, obesity, and several gastrointestinal malignancies [16,17]. However, the cross-sectional nature of the present study prevents determination of whether these conditions preceded cancer development or were influenced by cancer and its treatment.

Most patients in the present study received chemotherapy (83.2%), whereas 16.8% received radiotherapy. In addition, 86.3% reported that they did not follow a strict or specific diet after cancer diagnosis. Nutritional management is an important component of cancer care because gastrointestinal malignancy and anticancer treatment may influence appetite, food tolerance, gastrointestinal function, body weight, and nutrient intake. Nutritional counseling and individualized nutritional support may therefore be important during cancer treatment, particularly for patients experiencing weight changes or treatment-related nutritional problems.

An important finding of the present study was the substantial change in reported food consumption after cancer diagnosis. Before the onset of cancer, high proportions of participants reported consuming poultry, dairy products, red meat, sweets, carbonated beverages, canned foods, fatty foods, tea, and coffee. Following cancer diagnosis, consumption of several of these foods decreased, particularly red meat, sweets, carbonated beverages, canned foods, fatty foods, salted foods, and crackers. Conversely, consumption of fruits and vegetables increased markedly. These changes may reflect increased awareness of the relationship between diet and cancer, advice from healthcare professionals, changes in appetite, treatment-related symptoms, or patients' personal beliefs regarding foods considered beneficial or harmful.

The observed dietary changes are broadly consistent with evidence supporting greater consumption of plant-based foods and reduced consumption of highly processed foods, excess salt, and processed meat as components of a healthier cancer-prevention dietary pattern [16,18]. However, because dietary intake before cancer onset was assessed retrospectively, recall bias should be considered when interpreting these findings. In addition, the present study cannot determine whether the reported dietary patterns preceded cancer development or were influenced by other socioeconomic, cultural, or health-related factors.

Overall, the present study provides useful descriptive information regarding gastrointestinal cancer patients in Benghazi. Colon cancer was the most frequently represented malignancy, females constituted the majority of the sample, and patients aged 41–60 years represented the largest age group. Excess body weight, central adiposity, physical inactivity, high-fat and salted-food consumption, and metabolic comorbidities were common among the participants. In addition, substantial changes in dietary behavior were reported after cancer diagnosis, particularly

reductions in fatty, sweetened, canned, salted, and other energy-dense foods and increased consumption of fruits and vegetables. These findings highlight the importance of nutritional assessment, lifestyle counseling, and further epidemiological investigation of gastrointestinal cancer in Libya. Future multicenter studies involving cancer-free comparison groups are recommended to determine whether the observed dietary, anthropometric, metabolic, and lifestyle characteristics are independently associated with gastrointestinal cancer risk.

5. Conclusion

The present study revealed that, number of significant finding by which GIT cancer affect significantly more female than male. Furthermore, most age have been recognized with GIT cancer were those between ages 41-60 years. In the current work, there also been identified marital status married have higher GIT cancer compared to those counterpart. Distribution of highest GIT cancer among the patients shown colon, stomach and small bowel respectively, whereas, rectum, and liver cancer represent equally. In the present work, significant increase colon cancer in female and small bowel cancer was highly figured among the patients. All reported of GIT cancers were malignancy. Family history of GIT cancer shown less contribute for developing the cancer.

Anthropometric indices of patients body, both overweight and obese, large frame, and WHR were significantly high in patients. Chemotherapy were received by the majorities of patients and the patients shown significantly not follow any adherences or strict diet after chemotherapy. The most common risk factors implicated in GIT cancer and reported by patients were high fat intake, history of Heavier body weight (obesity), salted food and no physical activities. Consumption of food intake among patients reported that junk food and other stimulated food were significantly consumed in patients.

Declarations

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This study did not receive any grant from funding agencies in the public or not-for-profit sectors.

Conflict of Interest

The authors declare that they have no conflict of interest.

Consent for Publication

The authors declare that they consented to the publication of this study.

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Ethical Approval

The study was approved by the regional ethics committee and conducted according to the guidelines from Pharmacy committees . All participants provided written informed consent before commencement

References

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74(3):229-263. doi:10.3322/caac.21834.
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209-249. doi:10.3322/caac.21660.
3. World Cancer Research Fund. Meat and cancer [Internet]. London: World Cancer Research Fund; 2026 [cited 2026 Aug 27].
4. World Cancer Research Fund. Bowel cancer causes [Internet]. London: World Cancer Research Fund; 2026 [cited 2026 Aug 27].

5. Muscaritoli M, Arends J, Bachmann P, Baracos V, Barthelemy N, Bertz H, et al. ESPEN practical guideline: clinical nutrition in cancer. Clin Nutr. 2021;40(5):2898-2913.
6. Senesse P, Assenat E, Schneider S, Chargari C, Agostini D, Hébuterne X. Nutritional support during oncologic treatment of patients with gastrointestinal cancer: who could benefit? Cancer Treat Rev. 2008;34(6):568-575. doi:10.1016/j.ctrv.2008.03.003.
7. World Health Organization. Obesity and overweight [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Aug 27]. Available from: WHO: Obesity and overweigh
8. Ross R, Neeland IJ, Yamashita S, Shai I, Seidell J, Magni P, et al. Waist circumference as a vital sign in clinical practice: a consensus statement from the IAS and ICCR Working Group on Visceral Obesity. Nat Rev Endocrinol. 2020;16(3):177-189. doi:10.1038/s41574-019-0310-7.
9. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74(3):229-263. doi:10.3322/caac.21834.
10. Global gastrointestinal cancer statistics in 2022 and projection to 2050: GLOBOCAN estimates across 185 countries. [Journal details should be verified against your existing reference list before final submission.] Recent GLOBOCAN-based estimates indicate that the global GI cancer burden is expected to increase substantially, with particularly large proportional increases projected for Africa.
11. Tsokkou S, et al. Sex differences in colorectal cancer: epidemiology, risk factors, and clinical outcomes. J Clin Med. 2025;14(15):5539. doi:10.3390/jcm14155539.
12. Kim SE, Paik HY, Yoon H, Lee JE, Kim N, Sung MK. Sex- and gender-specific disparities in colorectal cancer risk. World J Gastroenterol. 2015;21(17):5167-5174.
13. Barzi A, Lenz AM, Labonte MJ, Lenz HJ. Molecular pathways: estrogen pathway in colorectal cancer. Clin Cancer Res. 2013;19(21):5842-5848.
14. Tsilidis K, Allen NE, Key TJ, Dossus L, Lukanova A, Bakken K, et al. Association between sex hormones and colorectal cancer risk in men and women: a prospective study. J Natl Cancer Inst. 2011;103(22):1738-1751.
15. Raghav K, Overman MJ. Small bowel adenocarcinomas—existing evidence and evolving paradigms. Nat Rev Clin Oncol. 2013;10(9):534-544. doi:10.1038/nrclinonc.2013.132.
16. Lauby-Secretan B, Scoccianti C, Loomis D, Grosse Y, Bouvard V, Guha N, et al. Body fatness and cancer—viewpoint of the IARC Working Group. N Engl J Med. 2016;375(8):794-798.
17. World Cancer Research Fund/American Institute for Cancer Research. Diet, nutrition, physical activity and cancer: a global perspective. Continuous Update Project Expert Report. London: World Cancer Research Fund International; 2018.
18. Bouvard V, Loomis D, Guyton KZ, Grosse Y, Ghissassi FE, Benbrahim-Tallaa L, et al. Carcinogenicity of consumption of red and processed meat. Lancet Oncol. 2015;16(16):1599-1600.