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Evaluation Of Nutritional Condition Pre- And Post-Surgery In Colorectal Cancer Patients At Saudi Arabia

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Abstract:

Background: The existence of a malignant tumor is one particular instance of how the illness and anticancer treatment profoundly disrupt homeostasis and metabolism. Thus, increasing weight loss and varied levels of malnutrition are common signs of the onset of a neoplastic disease and represent a significant issue in oncology**.** Goal of the research**.** One of the variables for the outcomes of surgery, chemotherapy, or radiation therapy to deteriorate is poor nutritional condition, which is typically linked to cancer. This study set out to evaluate the dietary health of CRC patients who were eligible for chemotherapy.
Methods and Materials: City Hospital (KAMC), Mecca, Saudi Arabia. From January 2024 to April 2024, all patients with colorectal cancer who visited the outpatient Surgery and Oncology department for the first time were invited to take part in the study. In order to determine the nutritional state of patients with colorectal cancer both before and after surgery and other therapies, an English questionnaire was created specifically for data collection. It was piloted, tested, and adjusted as necessary. a face-to-face interview with every patient who has been diagnosed with colorectal cancer. The interview lasted between twenty and thirty minutes (Karlsson et al., 2009).
Results: Thirteen female patients and seventeen male patients made up the total number of participants. Of the patients, 30% lacked literacy, 20% had an elementary or intermediate degree, 23.3% had a high school diploma, and 26.7% had a bachelor's degree or above. 90% of the patients were deemed well-nourished at the time of the initial assessment, while 100% had moderate levels of malnutrition. Out of the 46 patients who were assessed following surgery, one (4%) displayed evidence of severe malnutrition, the others had signs of moderate malnutrition, and the remaining patients were deemed to be well-nourished. Considering that three of the four patients who had displayed malnutrition symptoms on the initial evaluation continued to exhibit same scores after being admitted, there were four additional cases of malnutrition throughout hospitalization.
Conclusion: Colorectal cancer Patients definitely have a serious nutritional issue, which undoubtedly affects how their illness develops, how long they stay in the hospital following surgery, and how long they need to receive additional care. The majority of cancer patients need additional nutritional care since they are thought to be at risk for malnutrition. To find weight-loss patients early in the care pathway when they first reach the secondary care system, nutritional screening would be helpful in this group prior to surgery.

key words: colorectal cancer, chemotherapy, nutritional status, appetite, quality of life, malnutrition.

Introduction

The nutritional condition of cancer patients has drawn increasing scientific attention due to its potential therapeutic applications and prognostic significance. Globally, colorectal cancer ranks third in terms of cancer incidence and fourth in terms of cancer death for both sexes combined. The impact of dietary and lifestyle factors on the survival and recurrence of colorectal cancer is not well understood. Finding out how much malnutrition individuals with colorectal cancer experienced before and after surgery or other therapies was the goal of the current investigation. Global statistics show that 945 000 new cases of rectal and colon cancer (CRC) were reported worldwide in 2000, accounting for 9.4% of all new cancer cases worldwide each year.1, 2 It has been regarded as a significant burden that had a significant influence on public health globally and resulted in high mortality rates.3.

Prior research has demonstrated that cancer patients have significant physical and physiological changes, particularly with regard to their dietary status.4. Up to 85% of patients had been thought to suffer from cancer-related malnutrition.5 and several factors, such as the tumor's systemic influence, the host's reaction, or the negative effects of anticancer treatments, have been taken into account.6. In Asia and the southern regions of South America, the incidence is typically low and intermediate, respectively.

Despite being regarded as a low incidence region, colorectal cancer (CRC) is the second most common disease in the Kingdom of Saudi Arabia (KSA), behind breast cancer (National Cancer Registry MOH, 2003).According to the National Cancer Registry MOH (2007), 907 cases of colon cancer accounted for 9.9% of all newly diagnosed cases in 2007.Dietary and other environmental exposures are likely to account for regional variations in CRC (Parkin et al., 2005). olon cancer risk can be reduced by eating less red meat and avoiding processed meat entirely. Reducing alcohol use, increasing fiber intake, exercising, and keeping a healthy body weight can also help prevent about 64,000 instances of colon cancer annually, or 45% of all cases (Denise, 2011). Additionally, the risk of colorectal cancer (CRC) is significantly impacted by central depositions of adiposity (Gunter, Leitzmann, 2006) (Giovannucci, 2002).

Surgery, radiation therapy, and chemotherapy are the three primary forms of treatment for colorectal cancer.Two or more therapy modalities may be utilized concurrently or sequentially, depending on the stage of the malignancy (American malignancy Society, 2011).

Chemotherapy eliminates cancer cells, but it also harms some healthy cells, which can lead to adverse effects.The kind of medication, dosage, and duration of treatment will all affect these side effects. Hair loss, mouth sores, appetite loss, nausea, vomiting, an elevated risk of infection, easy bleeding or bruising following small wounds or accidents, and extreme fatigue are possible side effects. Skin pain, nausea, diarrhea, and other adverse effects are also brought on by radiation therapy (American Cancer Society, 2012).

Patients undergoing surgery for colorectal and upper gastrointestinal cancer are at risk for malnutrition due to a number of causes. These include the gastrointestinal side effects of nausea, vomiting, anorexia, diarrhea, and, in certain situations, dysphagia and malabsorption, as well as the catabolic effect of cancer (Nitenberg and Raynard, 2000 and Fettes et al., 2002).

In many facets of cancer development and treatment, nutrition plays significant (though not always completely understood) roles (Center, 2009). In addition to providing relief from nutrition-related symptoms and enhancing quality of life, healthy eating habits can assist cancer patients in maintaining their body's nutritional resources and weight (Johansson, 2009). According to Bozzetti (2009), poor feeding practices can result in undernutrition, which can lower odds of survival by increasing the risk of infection and increasing the frequency and severity of treatment side effects.

Malnutrition was shown to be more common in gastrointestinal cancers; between 30 and 60 percent of colorectal patients were found to be malnourished.7, 8 Longer hospital stays, decreased responsiveness to treatments, more problems from therapy and surgery, lower survival rates, and increased healthcare expenses can all be consequences of this.9–12 Hospitalized patients' nutritional health may be significantly impacted by some cancer medication treatments and surgical techniques. The so-called "fast-track" and other minimally invasive surgical methods are among the many advancements that have been made. When compared to traditional approaches, the data currently available on this technique for colonic surgery showed improved protein intake, oral energy, and body composition. Fast-track surgery has also been linked to lower rates of complications, less stress during the procedure, and shorter hospital stays, all of which may hasten recovery.13.

Aim of the study:
The current study aimed to compare fast track and conventional surgery methods, assess the nutritional state of colorectal patients before and after surgery, and determine whether there is a relationship between nutritional status and quality of life.

Methods:
A cross- sectional descriptive study was carried out among (60) Patients at King Abdullah Medical City Hospital (KAMC), Mecca, Saudi Arabia. From January 2024 to April 2024, all patients with colorectal cancer who visited the outpatient Surgery and Oncology department for the first time were invited to take part in the study. The most often cited reasons for nonparticipation were "people being too ill" or "the study's burden being too great." All participants were questioned regarding how active they typically are. All of them lacked physical activity (PAL) or were sedentary. Patients who have had any kind of treatment and are older than eighteen and have any condition affecting the cecum to the rectum are eligible to enroll. 50 patients of both sexes with a diagnosis of colon or rectal cancer who were admitted over the six months of the study were included in the sample. These patients were assessed both at admission and prior to release.

2. Methods:

2.1. Study Instruments:
In order to determine the nutritional state of patients with colorectal cancer both before and after surgery and other therapies, an English questionnaire was created specifically for data collection. It was piloted, tested, and adjusted as necessary. a face-to-face interview with every patient who has been diagnosed with colorectal cancer. The interview lasted between twenty and thirty minutes (Karlsson et al., 2009).

The questionnaire contains several sections

2.1.1. Socio-demographic data
Questions on the individuals' basic socioeconomic traits are included in this. Age, nationality, marital status, educational attainment of the patient and spouse (if married), occupation and employment status, working hours, income source, average household income, place of residence, type of dwelling, number of rooms, and number of family members are among the other personal characteristics that are gathered.

2.1.2. Medical history data
This is separated into two sections: before and after therapy. This section's questions cover the following topics: the primary tumor's location, symptoms, signs, evidence of metastases, affected area (if metastatic), family history of the disease, surgical history, medical history, medications, treatment types, and, lastly, dosages and sessions (if chemotherapy or radiation).

2.1.3. Nutritional assessment
BMI, triceps skinfold thickness (TST), mid-arm muscle circumference (MAMC), serum albumin (alb), serum prealbumin (palb), total lymphocyte count (TLC), and inadvertent weight loss of more than 5% in the previous month or 10% or more in the previous six months are all used to perform a comprehensive nutritional assessment (Thorsdottir et al., 2001). Anthropometric measurement, electric bioelectrical impedance analysis (BIA), and skinfold measurement were used to evaluate nutritional status.

Clinical information
The following details were included in the medical history: the date, location, and kind of surgery (conventional or fasttrack), the collateral antitumor treatments (chemotherapy or radiation), the diagnosis date, and the location and stage of the tumor. The time between diagnosis, histological confirmation, and study inclusion was taken into account while defining the disease duration. Along with food consumption, nutritional support required, post-surgery fasting period, and the presence and kind of subsequent post-surgery problems, the patient's discharge date was taken into account.

Skinfold measurement and anthropometric evaluation
Height, weight, arm circumference, and tricep skinfold were anthropometric factors. An ultrasonic stadiometer (Model MZ10020) was used to assess the patients' height, and the BIA scale was used to weigh them. Using a calliper, the non-dominant, pending arm, half distance between the olecranon and acromial

points, and the Tricep skinfold measurement (TSM) were measured. Using a flexible tape, the arm circumference (ACM) was measured at the sample location. The average value was calculated after both were taken three times.

Analysis of bioelectrical impedance

The nondominant arm's segmental lean mass, body fat mass, fat free mass, and total body water were measured using bioelectrical impedance with the TANITA BC-418MA, which employs a high frequency (50 Hz) and low amplitude (550 mA) electrical current.

Nutritional status classification

The first criterion to determine a potential risk of malnutrition was non-intentional weight loss: 10% during the previous six months, 5–10% during the previous three months, and/or 5% during the month before to hospital admission.

Furthermore, body mass index (BMI), which was determined by dividing height by weight, was also seen as an accountable variable. According to the Garrow criteria, a patient has a normal and healthy weight if their BMI is between 20 and 24.9 kg/m2, while a BMI below that is indicative of malnutrition. A patient is considered overweight if their BMI is between 25 and 30 kg/m2, and obese if it is greater than 30 kg/m2 (WHO 1995).

Food intake evaluation

All patients completed a validated semi-quantitative food frequency questionnaire15, which collected information on food intake, including portion size, cooking techniques, and meal diversity across multiple food groups. PIABAD software was used to evaluate the data gathered from this questionnaire.

Global Patient Generated-Subjective Assessment with Scoring (PG-SGA)

PG-SGA has shown itself to be a reliable malnutrition diagnostic test suitable for usage in hospital settings and with cancer patients.16 Clinical history, food consumption, physical examination, involuntary weight loss, dietary changes, symptoms that may impact nutritional status, and changes in functional capacity were all included in this diagnostic form, which the patient was required to complete. After that, the medical practitioner fills out the diagnosis and nutritional needs questionnaire and performs the physical examination.

The sum of the scores assigned to each item determined the nutritional status score, which was then categorized as follows: A for well-nourished, B for mild malnutrition, and C for severe malnutrition.17

Following these screenings, patients with particular nutritional requirements were found and categorized based on the care they required: Food instruction receives 0–1 points, modular supplements receive 2-3 points, additional supplements receive 4–8 points, and artificial enteral or parenteral nutrition receives >9 points.

Ethical Considerations:

Permission was attained from the head of department of Surgery and Oncology Clinic in King Abdullah Medical City Hospital (KAMC), Mecca, Saudi Arabia. .Patient was given consent before the interview.

Analysis of statistics

Descriptive statistics include the standard deviation and the arithmetic mean or average. The SPSS statistical package version 15 (1994) was used to examine the data. The results were then tabulated and graphically represented using the Harvard graphics packages version 4 (Harvard, 1998). According to Armitage et al. (2002) and Betty and Jonathan (2003), qualitative variables were presented as percentages and available association measures. This study also used Pearson's Correlation Coefficient (r) to examine the relationship between two quantitative variables. It assesses the type and degree of relationship between two quantitative variables. The range of r's value is -1 to +1.(Dietz Thomas and Kalof Linda, 2000)

Results:

The socioeconomic level of the patients who took part in the study is displayed in Table 1. Thirteen female patients and seventeen male patients made up the total number of participants. Of the patients, 30% lacked

literacy, 20% had an elementary or intermediate degree, 23.3% had a high school diploma, and 26.7% had a bachelor's degree or above. The primary source of income was their employment, with 50% of them living in shared housing and 43.33% in separate housing, respectively.

The anthropometric measurements of the sample of patients with colorectal cancer under study are displayed in Table (2). The average age ±SD for males and females was 54 and 49.30, respectively. Prior to therapy, males and females had respective mean ±SDs of 72.11, 24.25, and 86.53 and 32.93 for weight (kg) and body mass index (BMI). The mean ± standard deviation of weight (kg), body mass index (BMI), weight change, and weight loss for males and females following therapy, however, were 69.54, 23.76±0.14, 12.17, 13.61, and 76.07, 29.3, 13.23, and 15.05, respectively. In terms of unintended weight loss length, only 13.3% of patients saw weight change in a single month, however the majority of patients (50%) experienced weight change in three months, followed by 16.7% during six months and 16.7% throughout a year.

Table (2): Anthropometric Measurements of Studied sample of colorectal cancer patients (M±SD).

Variables Male (n=17) M±SD Female (n=13) M±SD All	Mean± SD	
Age	51.96±1.02	
Before Treatment		
Weight (kg)	78.36±1.12	
Height (cm)	166.8±8.31	
Body Mass index	28.01±0.25	
After Treatment		
Weight (kg)	72.37±1.66	
Height (cm)	166.8±8.31	
BMI	26.16±0.16	
Weight change	12.63±0.18	
Weight Loss	14.24±1.06	

the primary tumor site and cancer therapy kinds of study participants are displayed in table (3). Approximately 83.33% have a colon tumor and 16.66% have a rectum tumor. the many forms of cancer treatment, such as radiation, chemotherapy, and surgery. The majority of patients (43.33%) received both chemotherapy and surgery, whereas 26.66% only received surgery, 13.33% only received chemotherapy, another 13.33% received chemotherapy and radiation, and only 3.3% received both surgery and radiation.

Table (3): Distribution of location of the tumor and type of treatment for studied sample (Male &female) of colorectal cancer patients

Parameters	All (N=60) %
Location of the tumor	
Colon	50 83.33
Rectum	10(16.66
Which type of treatment did you receive	
Surgery	16 (26.66
Chemotherapy	8 (13.33
Surgery + chemotherapy	26(43.33
Surgery + Radiotherapy	- 2(3.33)
Chemotherapy + Radiotherapy	12(13.33)

The statistical comparison of the biochemical analyses for males and females prior to and following therapy is shown in Table (4). According to the statistical analysis of the prior data, there was a significant difference ($P < 0.05$) in males' CEA, HB, and albumin levels before and after therapy.

Regarding the biochemical analysis for females, we found that there was a high significant difference in albumin following treatments by ($P < 0.0$), although there was a significant difference in CEA, HB, and albumin before and after treatment ($P < 0.05$).

Table (5): Statistical evaluation of (SSM) for colorectal cancer patients before and after treatment

Parameters Male (n=17) % Female (N=13) %	**All (N=30) %**
Before Treatment	
<4	42 **70**
≥ 4	18 **30**
After treatment	
<4.	40 **66.66**
≥ 4	**20 33.34**

All of the anthropometric measurements and body composition factors obtained both before and after the procedure are summarized in the table. Body composition variables, including fat mass and fat free mass, as well as all anthropometric measurements, including weight, arm circumference, and tricep skinfold, showed a substantial decrease ($p < 0.001$).

Scored Patient Generated-Subjective Global Assessment (PG-SGA) before and after surgery

	Well nourished	Moderate malnutrition	Severe malnutrition
Before surgery	90%	10%	0%
After surgery	94%	4%	2%

90% of the patients were deemed well-nourished at the time of the initial assessment, while 100% had moderate levels of malnutrition. Out of the 46 patients who were assessed following surgery, one (4%) displayed evidence of severe malnutrition, the others had signs of moderate malnutrition, and the remaining patients were deemed to be well-nourished. Considering that three of the four patients who had displayed malnutrition symptoms on the initial evaluation continued to exhibit same scores after being admitted, there were four additional cases of malnutrition throughout hospitalization.

Table 6 Average body fat mass, body mass index, fat free mass, tricep skinfold and arm circumference according to PG-SGA classification PG-SGA

		Before surgery AVG ± SD	*After surgery AVG ± SD*
Weight (kg)	A	79.0 ± 13.2	69.6 ± 12.4
	B	62.9 ± 15.2	42.6 ± 12.8
BMI (kg/m2)	A	28.8 ± 4.1	27.3 ± 3.0
	B	22.9 ± 5.7	18.6 ± 6.9
Fat mass (kg)	A	21.2 ± 8.1	19.2 ± 7.6
B 6.	B	13.4 ± 12.0	1 ± 6.5
Fat free mass (kg)	A	54.0 ± 10.4	52.7 ± 9.8
	B	50.6 ± 8.1	37.5 ± 7.3
Tricep skinfold (mm)	A	12.8 ± 5.7	11.2 ± 4.9
	B	8.3 ± 5.4	5.5 ± 4.9
Arm circumference (cm)	A	25.4 ± 3.65	24.4 ± 2.8
	B	21.8 ± 4.73	16.5 ± 4.9

Prior to surgery, there was no discernible difference in lean body mass and fat mass between patients classified as well-nourished by SGA and those with moderate malnutrition ($p = 0.08$). Nevertheless, following surgery, there was a significant difference in average body fat mass between those who were moderately malnourished and those who were well-nourished ($p = 0.01$), as well as in fat free mass ($p = 0.037$). Table V presents this comparison.

BMI ($p = 0.872$), tricep skinfold ($p = 0.444$), arm circumference ($p = 0.886$), body fat mass ($p = 0.295$), lean body mass ($p = 0.387$), lean mass in the right and left arms ($p = 0.229$ vs $p = 0.314$), fat mass in the right and left arms ($p = 0.835$ vs 0.658), trunk lean and fat mass ($p = 0.256$ vs $p = 0.688$) were among the variables that were compared to the effect of surgery type. It's noteworthy to notice that fast track patients shed more weight and displayed lower fat free mass, tricep skinfold, and arm circumference values, even though no significant differences were discovered.

Discussion:

Globally, colorectal cancer ranks fourth in terms of cancer mortality for both sexes combined and third in terms of cancer incidence (Jinfu Hu et al., 2010). Proteincalorie malnutrition, often referred to as hypermetabolism-associated malnutrition, is prevalent in cancer patients and is unmistakably linked to the systemic inflammatory response and cytokine production (Falconer et al., 1994 and Staal-van den Brekel, et al., 1995). Patients in hospitals frequently suffer from malnutrition. Nonetheless, focus has not always been given to the nutritional component of medical management. As their disease progressed, colorectal cancer was caused by protein energy malnutrition, which also resulted in decreased oral intake because of diminished gustatory senses and elevated basal energy requirements because of their underlying illness (Sanz et al., 2008).

One of the wealthiest and highest per capita income nations in the world is Saudi Arabia. The population is experiencing overnutrition of macronutrients and malnutrition of micronutrients as a result of this high income, food abundance, and lack of nutritional awareness (Madani et al., 2000). A few indicators of malnutrition surfaced in the current study, highlighting the importance of nutritionists in providing targeted nutritional support and evaluating the nutritional status of patients with colorectal cancer.

Finding patients who are at nutritional risk and more likely to experience consequences is the aim of nutritional screening. Early intervention might be possible with early nutritional risk detection, potentially averting further difficulties. The ability of a screening tool to forecast results determines its validity. According to Thorsdottir et al. (2001), our research revealed a strong correlation between high nutritional risk as determined by the SSM sheet (Fig. 1). Seven questions including BMI, weight loss, anorexia, surgery, and other factors that may affect nutritional status make up the evaluation of SSM as a single nutritional indicator used in the entire nutritional assessment to detect malnutrition among cancer patients. For cancer patients, a total score of four or higher was the threshold for malnutrition. According to table (5), this SSM study found that 30% of participants were malnourished prior to treatment and 33.34 percent were after.

Twenty percent of cancer patients in an outpatient clinic with a clinical diagnosis of colon cancer were malnourished, according to a different study by Olof and Inga (2008) that utilized the SSM sheet. Patients with advanced malignant diseases frequently experience weight loss and malnutrition, which negatively affects their quality of life and survival (Laviano and Meguid, 1996; Delmore, 1997; and Noursissat et al., 2008). Unintentional weight loss is thought to be a more reliable indicator of malnutrition than BMI (Lipkin and Bell, 1993; Orr et al., 1984), and it has frequently been observed in cancer patients (Watson and Tang, 1980). Unintentional weight loss as a sign of malnutrition in cancer patients was found in table (2) for all participants (14.24±1.06 kg), but for males and females, the unintentional weight loss values were 13.61±1.83 kg and 15.05±1.75 kg, respectively.

According to Olof and Inga's (2008) investigation, the most effective single metric for identifying malnutrition was the overall unintended weight loss from the patients' self-reported prior customary healthy weight. But in terms of specificity and misclassification, it fell short of the SSM's standards. According to PG-SGA, the majority of the sample under study were well-nourished, however there was a significant prevalence of overweight and obesity. These findings conflicted with earlier research that linked hunger to this type of cancer.7,19 Obesity and overweight, however, are significant risk factors for cancer, including breast cancer and colorectal cancer (20, 21).22

These patients exhibited a significant loss and fusion of lean body mass with an excess of body fat mass, which characterized sarcopenic obesity, according to the results of the body composition examination.23, 24All anthropometric measurements, including weight, BMI, arm circumference, tricep skinfold, and body composition as assessed by BIA, had, nevertheless, dramatically dropped following the procedure. The significant reduction of fat-free mass at this time is particularly noteworthy. Two specific surgeries, rectal anterior resection and abdominal peritoneal resection, which were performed in 38 and 4% of patients, respectively, were primarily linked to higher losses. These procedures address the need for extra care in these particular individuals.

The nutritional condition of colon cancer patients deteriorates due to a number of causes. Tumor growth-induced anatomical alterations are a common cause, but metabolic changes like decreased insulin sensitivity that affect the metabolism of carbohydrates have also been linked to a number of symptoms. It has been demonstrated that while energy expenditure has increased, food intake appears to have decreased over time, leading to weight loss that is made worse by stress, pain, infection, and surgical procedures.4.

According to Karthaus and Frieler (2004), malnutrition affects up to 80% of patients with advanced colorectal cancer and is linked to poorer survival, longer hospital stays, decreased responsiveness, and higher overall healthcare costs. According to a retrospective analytic research conducted in the United States on 58 patients with stage III–IV colon cancer receiving treatment at Cancer Treatment Centers of America, 41% (24 of 58) of the patients had malnutrition, as assessed by SGA (Gupta et al., 2006).
Quality of life is a major priority in these situations, even though these clinical characteristics may eventually worsen the patient's fate. In light of this, it is now crucial to evaluate the nutritional state of patients with colon cancer and provide individualized nutritional treatment. Twelve Although patients who underwent fast track surgery experienced fewer difficulties and a shorter hospital stay, they also lost more weight and fat-free mass, which is consistent with earlier findings when taking this approach into account. Given the current findings, it is critical to draw the conclusion that, even if overweight and obesity have been commonly seen in colorectal patients, malnutrition risk should be taken into account because of the primary physiological and clinical alterations brought on by the growth of cancer and certain surgical techniques. These issues deal with the necessity of screening for nutritional status after a cancer diagnosis, while a patient is in the hospital, and after surgery.

Conclusion:
Although malnutrition symptoms are common when hospitalized for medical reasons, malnutrition does not appear to be common with this kind of cancer. A poor intake of fiber was found in the food intake study, which may be a risk factor. • Fast-track surgery is linked to a shorter hospital stay and appears to improve outcomes. While controlling malnutrition should be the goal of the nutritional support provided to these individuals, potential issues involving excessive weight must also be taken into account.

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