Effect of Preoperative Nutrition Educational Intervention for Colorectal Cancer Patients on Postoperative Clinical Outcomes

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Abstract

Background: Colorectal cancer is the second most prevalent type of cancer in the world. Nutrition plays a pivotal role in both the prevention of colorectal cancer and the management of patients undergoing treatment. **Aim of the present study** is to evaluate the effect of implementing preoperative nutrition educational intervention on colorectal cancer patients' postoperative clinical outcomes. **Subjects and method:** A quasi-experimental study was conducted , in department of surgery at Tanta University Educational Hospital, Tanta Cancer Center affiliated to Ministry of Health and Population and Damanhur Educational Hospital **Tools: Three tools** were used for data collection as follow; **Tool (1)** Structure assessment interview sheet of colorectal cancer patient" **Part (one)**:Bio Sociodemographic data: such as patient's code, name, age, sex, marital status, educational level, and occupation, Residence Body mass index (BMI)weight, height. **Part (two):** "**Nutritional needs assessment of colorectal cancer patient. Part three**: "Preoperative colorectal cancer patient nutritional intake assessment sheet **Part Four:** "Laboratory investigations .**Tool (II):** knowledge assessment tool of colorectal cancer patient about nutritional information. **Tool (III)** Postoperative clinical outcomes evaluation tool for colorectal cancer patient. **Results;** There was statistical significant improvement, information about nutritional status of patients in the study group. These results suggest Infective complications were reported in 72% of the control group compared to only 28% in the study group. The intervention may have contributed to improved recovery time and reduced hospitalization.**Conclusion and recommendations**: Preoperative nutrition educational intervention enhances patient clinical outcome and enhancing recovery for future Long-Term Nutritional maintenance. Future study of patients should prioritize long-term nutritional care.

Key wards: Colon, pre-operative, post-operative care, colorectal cancer.

Introduction:

Colorectal cancer (CRC) is cancer of the colon and rectum. It arises from the mucosa that lining the colon, rectum or both. Colorectal cancer (CRC) is one of the most common malignant neoplasms. Depending on the location, type of cancer or gender, it is ranked 2nd to 4th in terms of incidence in the world. CRC, year by year, shows an increasing tendency in terms of both morbidity and deaths. Colorectal cancer (CRC) is a leading cause of death worldwide, despite progress made in detection and management through surgery, chemotherapy, radiotherapy and immunotherapy **(Baidoun et al., 2021).** Colorectal cancer is the third most commonly diagnosed cancer globally, with over 1.9 million new cases reported annually. It is also the second leading cause of cancer-related deaths, accounting for approximately 935,000 deaths each year. The incidence of CRC varies by region, with higher rates observed in developed countries due to lifestyle factors such as diet and physical inactivity. However, early detection and advances in treatment have improved survival rates in recent years **(Ferlay et al., 2023).**

The symptoms of colorectal cancer often depend on the tumor's location and size. Common signs include changes in bowel habits, blood in the stool, unexplained weight loss, abdominal pain and fatigue. However, early-stage CRC may be asymptomatic, highlighting the importance of regular screening. Diagnostic methods include colonoscopy, biopsy, imaging studies like CT scans and blood tests to detect tumor markers such as carcinoembryonic antigen (CEA**) (Sawicki et al., 2021).**

Treatment for colorectal cancer depends on the stage and location of the tumor. Surgical resection, such as colectomy, is the primary treatment for localized cancer. Advanced cases may require chemotherapy, radiation therapy or targeted therapies. Multimodal approaches, combining surgery with adjuvant therapies, are often used to improve outcomes. The choice of treatment is tailored to the patient's condition and overall health **(Naguib, M., et al. 2022).**

Colorectal cancer significantly impacts patients' physical, emotional and social well-being. The disease and its treatment can lead to complications such as malnutrition, fatigue and psychological distress. Patients often face challenges related to changes in bowel function, body image and quality of life. Supportive care, including nutritional interventions and psychological support, is essential to address these challenges and improve patient outcomes (**Almeida-Lousada,**

Mestre,Ramalhete&Price,2021).

Nutrition plays a critical role in the management of colorectal cancer. Malnutrition is common among CRC patients due to the disease itself and the side effects of treatment. Proper nutrition helps maintain muscle mass, support immune function and enhance recovery after surgery. Nutritional interventions, including dietary counseling and supplementation, are integral to improving clinical outcomes and reducing postoperative complications **(Lewandowska et al., 2022).** Preoperative Nursing preparation is a crucial step in the management of colorectal cancer. It involves optimizing the patient's physical and nutritional status to reduce the risk of complications during and after surgery. Preoperative assessments, including nutritional screening, help identify patients at risk of malnutrition. Interventions such as dietary modifications oral nutritional supplements and immunonutrition are often implemented to improve surgical outcomes **(Piekarska et al., 2024).**

Colectomy is a surgical procedure to remove part or all of the colon, often performed to treat colorectal cancer. Depending on the tumor's location and extent, colectomy can be performed as a partial, total or hemicolectomy. The procedure may be done using open surgery or minimally invasive techniques such as laparoscopy. While colectomy is effective in removing cancerous tissue, it carries risks such as infection, bleeding and changes in bowel function. Preoperative optimization, including nutritional support, is essential to minimize these risks and improve recovery **(Keller et al., 2021).**

Nurses play a vital role in the preoperative, postoperative care of colorectal cancer patients, particularly in implementing and monitoring nutritional interventions. They are responsible for conducting nutritional assessments, providing dietary counseling and ensuring that patients adhere to preoperative nutrition plans. Nurses also collaborate with dietitians and surgeons to optimize patient outcomes. Their holistic approach, combining clinical expertise with patient education and support, is essential for improving postoperative

Significance of the study:

Colorectal cancer patients suffer of many nutritional problems that may lead to several complications which may affect post-operative outcomes. Little researches in nursing about specific nutrition intervention and education of this intervention for colorectal cancer patient either pre or post operation. Many methods of nutrition intervention are known and encompass continuous, cyclic, intermittent and immune enhancing formula. Also many medical

researches internationally were done about effect of uses those different formulas on gastrointestinal cancer and little in nursing. So this study will be done to prevent and overcome complications and improve health nutritional status of those patients

The aim of the study was: to

Evaluate the effect of implementing preoperative nutrition educational intervention on colorectal cancer patients' on postoperative clinical outcomes.

Research hypothesis:- The study group of colorectal cancer patients who will receive preoperative educational intervention will exhibit reduction of post-operative complications than control group, and will improve postoperative clinical outcomes than control group. The study was used a quasi- experimental research design.

Setting:

The study was carried out at the department of surgery at Tanta University Educational Hospital, Tanta Cancer Center affiliated to Ministry of Health and Population and Damanhur Educational Hospital. Tanta Cancer Center

The Study group : The study subjects comprised fifty (50) patients of both sexes scheduled for colectomy surgery and evaluated after the implementation of preoperative nutrition teaching intervention, they will be divided into two equal groups by randomly selected methods, each group consist of 25 patients will represent study group and control group.

-Confidence level of error 5% type 1 error .05 and power of test 95% of confidence on Epi info.software program.

-Equation for determining patient sample size at 95% confident power of the study Steven Thimpsona equation

$$n = \frac{N \times P(1-P)}{(N-1 \times (d2 / z^2) + P(1-P)}$$

N= total society size

D= error percentage (0.05)

Z= the correspond stander class of significant 95% (1. 69)

P= percentage of availability of the objectivity = (0. 1)

-Subjects were selected according to the following criteria

Inclusion criteria for patient: the patient will be selected according to the following criteria:-

- Conscious Patients of Both sexes and able to communicate.
- Patients (aged ≥18 years).

-Confirmed diagnosis of carcinoma of the colon cancer according to

-Stages of colon cancer. (Stage 1, stage 2 and stage 3).

-Exclusion criteria include the following criteria:-

- Patients over 60 years.

- Patient with stage (4) of colorectal cancer.

Tools of data collection: Three tools was used to conduct this study

Tool (I) "Structure interview sheet of colorectal cancer patient". This tool was developed by the researcher based on relevant literature to collect the required data from the patients and from their medical records it included two parts:

Part one: "Bio -Socio-demographic data" include the data related to patient's code, age, sex, residence, marital status, educational level, occupation, income, and date of admission. In addition to, data related to patients' medical and clinical data as previous and current medical history, stage and site of colorectal cancer, feeding pattern from patients' record, and lifestyle as smoking and / or consuming alcohol, family history as hypertension or heart disease, date of admission, discharge date, and duration of hospitalization.

"Anthropometric measurements" Series quantitative measurement for four days (first, second, third, and fourth day of admission) of the muscle, bone and adipose tissue used to assess the composition of the body. The core elements of anthropometry are weight, height, body mass index (BMI), chest, and waist, mid arms circumferences, skin fold thickness and daily caloric needs**.**

Part three: "Preoperative colorectal cancer patient nutritional intake assessment sheet" it used to compare the daily nutritional intake by the two groups during preoperative period it was related to the following items: (amount of formula received and type, caloric content, actual calories received and ideal caloric needs). Moreover, fluid intake (oral, NGT, and / or I.V) and output was calculated.

Part Four: "Laboratory investigations"

It includes data related to the measurement of serum protein, serum albumin, hemoglobin, total lymphocytic count, serum sodium and potassium, serum creatinine and blood urea from patients' medical records.

Tool (II): knowledge assessment of colorectal cancer patient about nutritional information:

This tool was developed by to researcher after reviewing of relevant literature **(Gibbs, Zhang,., & Sullivan, 2018).** to assess patients' knowledge regarding nutrition (types of diet, prescribed food, food content and frequency) that must be taken by colorectal cancer patients and it was used for both groups.

It consisted of two parts:

Part (I) Symptom of colorectal cancer:

It was developed to assess patients' knowledge about colorectal cancer symptoms

Part II: Participant (patients') questionnaire responses to diet change:

- It was used to assess patients' responses of practices related to diet changes (such as dietary changes made due to treatment.

-It includes Diet pattern pre & post treatment, Dietary advice received during treatment and from who, sufficient or not, and beliefs influence of diet on CRC recurrence**.**

-The scoring system was as follow: the total score was adjusted from 0 to 100 and classified the level of self-care practice to unsatisfied (ranging from 0 to 33.3), moderate (range from 33.4 to 66.6) and satisfied (ranging from 66.7 to 100).

Tool (III): Postoperative clinical outcomes evaluation tool for colorectal cancer patient. This tool was developed by the researcher based on relevant literature to evaluate the effect of nutritional therapy on postoperative outcomes for colorectal cancer patient

Part I: "Wound healing assessment"

-It was developed by the researcher to assess wound healing and wound infection during the postoperative period for the colorectal cancer patient after review of recent related literature. It included assessment of peri-wound skin area, wound margin, wound drainage, wound odor, slough/necrosis, granulation, and factor of delayed wound healing which included delayed removal of suture, bleeding, and wound infection. It also assesses the pain level as site, severity, and frequency. The scoring system is as follow:

-Well healed allocated score (3),

-Partially healed allocated score (2),

-Poorly healed allocated score (1),

-And not healed allocated score (0).

Part (2): "Clinical sepsis indicators"

It includes one or more of the following clinical criteria ;(fever >38^{o}C, hypotension, oliguria and WBcs count less than 4000 or more than 11000).

The scoring system was as follow

Presence of fever >38oC, hypotension, oliguria and WBcs count less than 4000 or more than 11000 allocated score (2).

-Absence fever >38oC, hypotension, oliguria and WBcs count less than 4000 or more than 11000 allocated score (1)

Part (3): "Gastric motility complications assessment tools "

It includes assessment of bowel movement through hearing of bowel sound and frequency of movement/ minute to determine presence of paralytic ileus as well as manifestations of bowel obstruction such as abdominal distention and vomiting. In addition to, assessment of the vomitus as its color, amount, and odor. The scoring system of gastric

motility complications: Normal bowel sound (2), Absence of bowel sound (1).

Methods of data collection:

-An official letter was issued from the Faculty of Nursing, Tanta University to the director of Tanta University Educational Hospital, Tanta Cancer Center and Damanhour Oncology Center.

-Permission from the head nurse of the study settings training units in previous mentioned settings was obtained, after taking a copy of the study protocol and the study booklet, and giving information about the purpose of the study, the date, and the time of data collection.

-Tool I (Socio-Demographic and Clinical Data of CRC Patients Structured Interview Schedule, tool II (knowledge assessment tool of colorectal cancer patient about nutritional information), and tool III (Postoperative clinical outcomes evaluation tool for colorectal cancer patient) were developed by the researcher based on relevant literature.

-Tools I, tool II and tool III were tested for content validity by five experts in the related fields of the study namely and the required modifications were carried out accordingly.

-The Arabic version of tools was used in the study to evaluate the effect of implementing preoperative nutrition educational intervention on colorectal cancer patients on postoperative clinical outcomes.

-Reliability of study tools were tested for internal consistency by using Cronbach's coefficient alpha test. It was applied to 8 patients who fulfilled the inclusion criteria of the study subjects, and those patients were not included in the study subjects. The reliability result for tool I was r= 0.97, and tool II reliability was r=0.70 and reliability for tool III was r=0.93, and test reliability ranged between 0.7 and 1.

-A pilot study was carried out on eight patients diagnosed with CRC to assess the applicability, clarity, and feasibility of the study tools. The necessary modifications were done accordingly.

-The proposed nutrition plan was developed as a manual guideline by the researcher after review of the relevant literature. It included introduction related to CRC, signs and symptoms of CRC, risk factors that aggravate CRC, prevention of CRC, and nursing care for CRC. This booklet is written in Arabic language, and entails includes detailed pictures for more clarity and to overcome prevalence of illiteracy among illiterate population.

-Ethical considerations:

-An informed written consent was obtained from each study subject included in this study after appropriate

explanation of the study purpose. Anonymity and privacy of the study subjects and confidentiality of the collected data were assured. The patients also informed about the right to withdraw from the study at any time without penalty.

-Each patient was interviewed individually after admission to explain the aim of the study and plan the time schedule with him/her and his/her care giver then the researcher provided rest time for the patient before starting the first session.

Baseline assessment: In the preoperative period, patients' participants from both (study and control groups) were interviewed individually in order to assess their pre-baseline data such as (socio-demographic data, nutritional status, and knowledge level) using tool I. The researcher conducted the assessment at the inpatient ward within 24 hours after patients' admission. Also, the telephone number of every patient was taken to facilitate communication with the subjects after discharged from the hospital, maintain relationships with them and prepare for meetings.

Implementation phase:

-The educational program was implemented through individual sessions with patients' participants for 3 days. 3 days inpatient at surgical ward in the Tanta Cancer Center and Damanhour oncology center (first day; data of admission, second day; zero day of operation, and third day; second day of operation).

-The patients' participants received the educational program before operation to avoid any pain.

The patients' assigned to the control group received the routine oncology center care provided for all patients with CRC regardless of their age. This care is provided by nursing staff of the hospital.

-The educational program was implemented through three sessions in the inpatient hospital; two sessions preoperatively and one session were held postoperatively and extended till patient discharge from the oncology center as follow:

-Educational guidelines regarding care of patients undergoing colonoscopy was developed and implemented by the researcher based on relevant literature, determining needs, baseline measures researches and expected outcomes. Motivation and reinforcement during training sessions were used in order to enhance the nurses for the sharing in this study, in order to implement educational guidelines, using different methods of teaching.

Educational session:

Educational sessions were given to all studied patients included in the study and educational guideline was implemented over three (3) sessions,

each session taking 30:50 minutes per day for three consecutive days. Sessions were being given to five patients, each session started by pre-test& ended by post-test. Sessions for patients were carried out during the morning shift.

The content of each session was divided as following:

First session

First session: Orientation and Basic Concepts.

-**Content included:** Simple anatomy and function of the colon
-Definition of colorectal cancer
-Causes, risk factors
-Common types and clinical manifestations
-Overview of colectomy (types, purpose, expectations)
-Teaching tools: PowerPoint, booklet introduction

Second session: Preoperative Nutrition.

-**Content included**:
-Nutritional goals before surgery (prevent malnutrition, enhance healing) Types of prescribed feeding: oral, NGT, IV nutrition
-Dietary contents: proteins, vitamins, fluids
- Instructions for patients regarding meal planning and fluid intake
- How to avoid fasting and strategies to manage poor appetite
-Demonstrations included: sample meals, feeding setup
-Booklet section discussed: preoperative nutrition checklist

Third session: Postoperative Nutrition and Discharge Instructions

Evaluation Phase:

-Tool one will be used as the following Part one will be used one time preoperative, part two will be used three times preoperative , immediately , post-operative one week and part four three time preoperative , immediately and one week post-operative - Patients who will receive preoperative educational nutritional intervention by the researcher will be evaluated using tool II to evaluate patient knowledge about nutrition twice time immediately pre teaching session and immediately post last teaching session - Tool (III) will be used immediately post-operative, one week and after three weeks at outpatient clinics after surgery because this is the time of complete healing to evaluate postoperative complications such as tool III (part 1) to evaluate delayed wound healing ,tool III (part 2) to evaluate clinical sepsis indicator and, tool III (part3) to evaluation II, tool III, and fourth time before discharge.

Results:

Table (1): Shows Distribution of socio demographic data for colorectal cancer patients under surgery (n=50) : This table showed that the majority of the studied patients

in both groups were aged from 45–60 years, representing 56% in the study group and 44% in the control group. **Regarding sex**, more than half (56%)of the study group and about two third (64%)of the control group were male. **Concerning marital status**, most of the patients about more than quarter three were married, with 80% in the study group and 84% in the control group. **In relation to education level**,(44% ,36%)of the study group of the control group had a Diploma, while 28% and 32% were illiterate respectively. **As for occupation**, the highest percentage in both groups had private work (52% in the study group and 44% in the control group). **Regarding income level**, nearly half of the study group (48%) and more than half of the control group (60%) had middle income. There was no statistically significant difference between both groups in all biosociodemographic data,P-value > 0.05.

Table (2): Demonstrates Distribution of colorectal cancer patients according dietary pattern (n=50). This table illustrates the dietary patterns among colorectal cancer patients. It was observed that more than half (60%) of patients in the study group reported dietary changes due to treatment compared to 56% in the control group, with no statistically significant difference between the two groups (p = 0.774). the difference was not statistically significant (p = 0.149).Regarding the dietary pattern before diagnosis, more than half of patients in the study group followed a prudent dietary pattern compared to 52% in the control group, while 40% and 48% followed a Western pattern, respectively (p = 0.569). After diagnosis, a similar pattern was observed (p = 0.774), with 60% of the study group and 56% of the control group reporting a prudent dietary pattern.

Concerning the reason for dietary change post-diagnosis, most patients reported gastrointestinal symptoms as the main cause, followed by dietary advice and taste changes. However, the differences were not statistically significant (p = 0.14).

Table (3): Represents kidney function test results among the studied patients in the study and control groups throughout the follow-up period (Day 1 to Day 4). **Regarding serum creatinine levels**, more than half (56.0% and 52.0%) of patients had high levels by Day 4 in the study and control groups respectively. **As for blood urea,** high levels were observed in 28.0% of the study group and 36.0% of the control group by Day 4. Concerning serum protein levels, more than two third (72.0% , 64%)of patients in the study group and 64.0% in the control group had normal levels

on the last day of follow-up respectively .

Throughout the study period, there was no statistically significant difference between the study and control groups in any of the kidney function parameters (serum creatinine, blood urea, and serum protein), as all (p-values > 0.05).

Table (4): This table illustrates the comparison between the study group and the control group regarding anthropometric measurements. It was found that:

The weight ranged from 75 to 124 kg in the study group and from 78 to122 kg in the control group, with mean values of 95.45 ± 15.39 and91.34 ± 16.95 respectively. The difference was statistically non-significant (p = 0.374)The height ranged between 162–191 cm in the study group and 165–189 cm in the control group, with mean values of 176.47 ± 8.65 and 175.24 ± 7.63 respectively, and the difference was not statistically significant (p = 0.596)

Regarding BMI, it ranged from 21.54 to 34.32 in the study group and from 22.63 to 33.74 in the control group. The mean BMI was 28.18 ± 4.23 in the study group and 27.93 ± 4.19 in the control group, showing no significant difference (p = 0.836)

Table(5): Represents the serum electrolytes levels (sodium, potassium, chloride, and calcium) among the studied patients in both the study and control groups across four days of follow-up.Regarding serum sodium, 78.0% of patients in the study group and slightly more half (56.0%)in the control group had low sodium levels by Day 4. There was a statistically significant difference between the study and control groups (p = 0.022), indicating a higher proportion of hyponatremia in the study group.Concerning serum potassium, low levels were found in slightly two third 72.0% of the study group and two third (64.0%) of the control group by Day 4.

The comparison showed a statistically significant difference between the two groups (p = 0.040), with a higher percentage of hypokalemia in the study group.

As for serum chloride, less than one third and 20.0% of the study group and 24.0% of the control group had low levels by Day 4. However, there was no statistically significant difference observed between both groups (p = 0.761.(

Regarding serum calcium, 28.0% of the study group and 40.0% of the control group had low calcium levels by the end of the follow-up. The difference between the two groups was not statistically significant (p = 0.479(

In conclusion, the table demonstrates that **there were statistically**

significant differences between the study and control groups in serum sodium and potassium levels (p value **0.018*,0.022***), while no significant differences were found in chloride and calcium levels during the follow-up period

Table (6): Shows Distribution of Studied patients for colorectal cancer patients according their background knowledge about nutrition for colorectal patients.

The majority about more than three quarter(80%, 84%) respectively in the study group and control group had mild level of knowledge nutritional status preoperatively, while the about (20% and 16%, respectively)of both groups had fair nutrition none of the participants in either group were classified as having good knowledge about nutritional status prior to the intervention. However, significant differences emerged post-intervention (p = 0.001). In the study group, about three quarter had (72% of study group achieved high level of knowledge about nutritional status postoperatively, compared control group. Additionally one third 36% of the control group after the intervention achieved moderate level of knowledge. These results demonstrate significant improvement information's about nutritional status of patients in the study group following the applied intervention. Statistical analysis using the Chi-square test revealed no statistically significant difference between the two groups regarding their knowledge levels (p = 0.508).

Table (7): Shows Distribution of colorectal cancer patients according Clinical sepsis indicators , there were no statistically significant differences between the study and control groups regarding clinical indicators of post-operative infection and inflammation (p > 0.05 for all variables). Fever exceeding 38°C was reported in 32% of patients in the study group compared to 40% in the control group (, p = 0.556).. Regarding leukocyte counts, a low white blood cell (WBC) count (< 4000/uL) was seen in 12% of the study group and 16% of the control group (p = 0.684), while elevated WBC counts (> 11,000/uL) were found in 8% and 12% of patients, respectively (p = 0.637). Analysis of the neutrophil-to-lymphocyte ratio (NLR) revealed that 64% of the study group and 56% of the control group had a ratio <3; 28% vs. 32% had a ratio between 3 and 5, and 8% vs. 12% had a ratio >5. The differences in NLR distribution were not statistically significant (p = 0.819). These findings indicate that the clinical markers of systemic inflammatory response and infection were comparable between both groups.

Table (1): Distribution of Colorectal cancer Patients undergoing surgery according to Sociodemographic surgery (n=50)

Items	The studied groups				χ^2	P value
	Study (n=25)		Control (n=25)			
	N	%	N	%		
Age						
18 – 30	4	16.0	5	20.0	0.723	0.697
31 – 45	7	28.0	9	36.0		
45 – 60	**14**	**56.0**	**11**	**44.0**		
Range	18 – 59		20 – 58			
Mean ± SD	46.52 ± 10.39		48.15 ± 9.76			
Sex						
Male	**14**	**56.0**	**16**	**64**	0.329	0.564
Female	11	44.0	9	36		
Marital status						
Married	**20**	**80.0**	**21**	**84.0**	0.142	0.713
Widow	5	20.0	4	16.0		
Education level						
Illiterate	7	28.0	8	32.0	6.069	0.300
Primary	2	8.0	6	24.0		
Secondary	4	16.0	1	4.0		
University	0	0.0	1	4.0		
Diploma	**11**	**44.0**	**9**	**36.0**		
Master	1	4.0	0	0.0		
Occupation						
Governmental	6	24.0	4	16.0	1.634	0.652
Private	**13**	**52.0**	**11**	**44.0**		
Farmer	4	16.0	6	24.0		
House wife	2	8.0	4	16.0		
Income						
Low	4	16.0	3	12.0	0.731	0.696
Middle	**12**	**48.0**	**15**	**60.0**		
High	9	36.0	7	28.0		
Duration of hospitalization						
Range	3 – 10		4 – 12		T: 1.318	0.193
Mean ± SD	6.37 ± 1.97		7.16 ± 2.25			

Table (2): Distribution of colorectal cancer patients according dietary pattern (n=50)

Dietary pattern	Patients response	Study (n=25)		Control (n=25)		χ^2	P value
		N	%	N	%		
Dietary changes made due to treatment	Yes	15	60	14	56	0.082	0.774
	No	10	40	11	44		
Dietary advice received during treatment	Yes	25	100	23	92	2.082	0.149
	No	0	0	2	8		
Dietary pattern pre-diagnosis	Prudent	15	60	13	52	0.321	0.569
	Western	10	40	12	48		
Dietary pattern post-diagnosis	Prudent	15	60	14	56	0.082	0.774
	Western	10	40	11	44		
Reason for dietary change post diagnosis	No change	18	72	16	64	5.429	0.143
	Dietary advice	0	0	3	12		
	Taste changes	0	0	1	4		
	Gastrointestinal symptoms	7	28	5	20		
Dietary advice received from	Not applicable	0	0	0	0	3.032	0.386
	A friend, family member or media source	0	0	0	0		
	A dietitian	4	16	6	24		
	A doctor	14	56	15	60		
	A nurse	7	28	3	12		
	A stomatherapist	0	0	1	4		
	A complementary health practitioner	0	0	0	0		
	An Internet source	0	0	0	0		
Dietary information sufficient to meet needs	Far too little	0	0	0	0	-	-
	Too little	0	0	0	0		
	About right	25	100	25	100		
	Too much	0	0	0	0		
	Far too much	0	0	0	0		
Received dietary advice during treatment	Yes	25	100	25	100	-	-
	No	0	0	0	0		
Level of dietary information received	Far too little	0	0	1	4	3.189	0.203
	Too little	0	0	2	8		
	About right	25	100	22	88		
	Too much	0	0	0	0		
	Far too much	0	0	0	0		
Belief: influence of diet on CRC recurrence	None Possible influence	0	0	0	0	4.172	0.125
	A little influence	0	0	2	8		
	Significant influence	10	40	14	56		
	A big influence	15	60	9	36		
Interest in receiving additional dietary information	Not interested	0	0	2	8	2.631	0.268
	Possibly interested	9	36	6	24		
	Very interested	16	64	17	68		
Consideration of dietary change based on information	Yes	19	76	17	68	0.402	0.529
	No	6	24	8	32		
	Unsure	0	0	0	0		

Table (3): Distribution of the studied patients according to their kidney function tests (n=50):

Kidney function tests			Day 1		Day 2		Day 3		Day 4		χ^2	P
			N	%	N	%	N	%	N	%		
Serum creatinine	Study	Normal	11	44	13	52	14	64	15	60	1.413	0.704
		High	14	56	12	48	11	44	10	40		
	Control	Normal	9	36	10	40	11	44	12	48	0.821	0.844
		High	16	64	15	60	14	56	13	52		
χ^2			0.329		0.721		0.724		0.718			
P value			0.564		0.395		0.396		0.395			
Blood urea	Study	Normal	18	72	19	76	21	84	20	80	1.172	0.761
		High	7	28	6	24	4	16	5	20		
	Control	Normal	16	64	17	68	20	80	18	72	1.701	0.637
		High	9	36	8	32	5	20	7	28		
χ^2			0.372		0.402		0.138		0.438			
P value			0.544		0.529		0.713		0.508			
Serum protein	Study	Normal	10	40	13	52	15	60	18	72	5.517	0.137
		High	15	60	12	48	10	40	7	28		
	Control	Normal	11	44	12	48	14	56	16	64	2.368	0.450
		High	14	56	13	52	11	44	9	36		
χ^2			0.084		0.078		0.084		0.372			
0.564			0.774		0.778		0.774		0.544			
Serum albumin	Study	Normal	11	44	13	52	15	60	16	64	2.379	0.497
		High	14	56	12	48	10	40	9	36		
	Control	Normal	9	36	11	44	12	48	13	52	1.408	0.702
		High	16	64	14	56	13	52	12	48		
χ^2			0.332		0.318		0.718		0.742			
P value			0.564		0.571		0.395		0.390			

Chi square test (*) statistical significant difference
(**) highly statistical significant difference

Table (4): Distribution according to anthropometrics data for colorectal cancer patients under surgery.

		Study (n=25)	Control (n=25)	t. test	p. value
Weight	Range	75 – 124	78 – 122	0.902	0.374
	Mean ± SD	95.45 ± 15.39	91.34 ± 16.95		
Height	Range	162 – 191	165 – 189	0.529	0.596
	Mean ± SD	176.47 ± 8.65	175.24 ± 7.63		
BMI	Range	21.54 – 34.32	22.63 – 33.74	0.211	0.836
	Mean ± SD	28.18 ± 4.23	27.93 ± 4.19		
Chest circumference	Range	95 – 150	96 – 148	0.842	0.407
	Mean ± SD	128.45 ± 18.53	124.39 ± 15.63		
Waist circumference	Range	70 – 105	71 – 106	1.069	0.289
	Mean ± SD	86.74 ± 8.13	84.39 ± 7.35		
Mid arm circumference	Range	25 – 38	27 – 37	1.093	0.282
	Mean ± SD	31.52 ± 3.18	32.51 ± 3.25		

Table (5): Distribution of the studied patients according to their serum electrolytes (n=50):

Serum electrolytes			Day 1		Day 2		Day 3		Day 4		χ^2	P
			N	%	N	%	N	%	N	%		
Serum sodium	Study	Normal	10	40	13	52	17	78	20	80	**9.672**	**0.022***
		Low	15	60	12	48	8	32	5	20		
	Control	Normal	9	36	10	40	11	44	12	48	0.821	0.844
		Low	16	64	15	60	14	56	13	52		
χ^2			0.084		0.718		2.918		5.562			
P value			0.771		0.395		0.087		0.018*			
Potassium	Study	Normal	11	44	12	48	18	72	19	76	**8.328**	**0.040***
		Low	14	56	13	52	7	28	6	24		
	Control	Normal	8	32	9	36	12	48	14	56	3.712	0.294
		Low	17	68	16	64	13	52	11	44		
χ^2			0.758		0.741		3.001		2.231			
P value			0.382		0.390		0.083		0.136			
CL	Study	Normal	18	72	19	76	21	84	20	80	1.172	0.761
		Low	7	28	6	24	4	16	5	20		
	Control	Normal	16	64	18	72	17	68	19	76	0.948	0.813
		Low	9	36	7	28	8	32	6	24		
χ^2			0.371		0.102		1.752		0.123			
P value			0.544		0.747		0.185		0.733			
Ca	Study	Normal	13	52	14	56	16	64	18	72	2.479	0.479
		Low	12	48	11	44	9	36	7	28		
	Control	Normal	12	48	13	52	14	56	15	60	0.813	0.848
		Low	13	52	12	48	11	44	10	40		
χ^2			0.079		0.083		0.623		0.802			
P value			0.778		0.777		0.432		0.370			
			Day 1		Day 2		Day 3		Day 4		χ^2	P
			N	%	N	%	N	%	N	%		
Mg	Study	Normal	14	56	15	60	16	64	18	72	1.502	0.682
		Low	11	44	10	40	9	36	7	28		
	Control	Normal	13	52	14	56	15	60	16	64	0.823	0.844
		Low	12	48	11	44	10	40	9	36		
χ^2			0.083		0.082		1.472		0.103			
0.564			0.777		0.774		0.225		0.747			

Table (6): Distribution of Studied patients for colorectal cancer patients according their background knowledge about nutrition for colorectal patients (n=50).

Nutritional information	The studied groups				χ^2	P
	Study (n=25)		Control (n=25)			
	N	%	N	%		
Pre						
Mild level of knowledge	20	80	21	84		
Moderate level of knowledge	5	20	4	16	0.142	0.713
High level of Knowledge	0	0	0	0		
Post						
Mild level of knowledge	0	0	16	64		
Moderate level of knowledge	7	28	9	36	34.251	0.001*
High level of Knowledge	18	72	0	0		
χ^2	38.328		2.601			
P	0.001*		0.107			

Table (7): Distribution of colorectal cancer patients according Clinical sepsis indicators (n=50).

Clinical sepsis		Study (n=25)		Control (n=25)		χ^2	P value
		N	%	N	%		
Fever >38°C	Yes	8	32	10	40	0.352	0.556
	No	17	68	15	60		
	Other	0	0	0	0		
Hypotension systolic BP<90mmhg	Yes	6	24	5	20	0.123	0.733
	No	19	76	20	80		
	Other	0	0	0	0		
Oliguria <20ml/hr	Yes	13	52	14	56	0.082	0.777
	No	12	48	11	44		
	Other	0	0	0	0		
WBcs count less than 4000u/L	Yes	3	12	4	16	0.173	0.684
	No	22	88	21	84		
	Other	0	0	0	0		
WBcs count more than 11000u/L	Yes	2	8	3	12	0.221	0.637
	No	23	92	22	88		
	Other	0	0	0	0		
Neutrophil / Lymphocyte Ratio	< 3	16	64	14	56	0.402	0.819
	3 – 5	7	28	8	32		

Discussion

Colorectal cancer (CRC) is one of the most common malignancies globally and remains a major contributor to cancer-related morbidity and mortality Although surgical resection is the primary curative modality, postoperative outcomes are frequently hindered by complications such as wound infections, delayed bowel recovery, and prolonged hospital stays **(Miller et al., 2022).** Recently, there has been growing recognition of the crucial role that nutritional status plays in surgical recovery, particularly in colorectal cancer patients who are often at risk of malnutrition. **(Siegel et al., 2023).**

Preoperative nutritional education interventions aim to improve patients' dietary knowledge and practices before surgery, thereby enhancing their physiological readiness and resilience to surgical stress **Reber, Schönenberger, Vasiloglou& Stanga, Z. (2021).** Despite these benefits, nutritional education is still underutilized in standard preoperative care protocols. Therefore, this study aims to investigate the effect of implementing a structured preoperative nutritional education intervention on postoperative clinical outcomes among patients undergoing colorectal cancer surgery **(Kehlet & Wilmore, 2021).**.

Regarding bio socio demographic data, the finding of current study revealed that that the majority of colorectal cancer patients in both study and control groups were males and aged between 45 and 60 years. This finding the same line with prior epidemiological data that indicates a higher prevalence of colorectal cancer in middle-aged and older males **(Siegel et al., 2023).** Additionally, most patients were married and had middle levels of income and education. This is consistent with the findings of **Valdes G et al. (2018) and Blagojevich M et al. (2019),** who reported that about one-third of studied patients fell within this age group. In contrast**, Aaltonen S & Karjalainen H (2017)** stated that half of their studied population was aged 20–30 years This is consistent with the findings of **Valdes G et al. (2018)** and **Blagojevic et al.(2019**).

Regarding sex, more than half of the study group and about two-thirds of the control group were males. This matches the results reported by **Geyer M & Schönfeld C (2018),** who observed a higher prevalence of colorectal cancer among males **concerning marital status,** the vast majority of both groups were married in study. This is consistent with **Ali & Zahran (2017)** who noted that social support through marital status contributes to coping with cancer treatment .**As for education,**

diplomas were the most common level followed by illiteracy .This is similar to the study by **Farag et al. (2016),** which indicated that low educational levels may correlate with delayed diagnosis. Lower educational attainment has been associated with limited health literacy, which may affect patients' understanding of their disease and the importance of nutritional or postoperative instructions **(Ishikawa et al., 2019).**

In terms of occupation, private work was the most reported study, 44% control). This consistent with finding the findings **of Kamal et al. (2019)** who observed that colorectal cancer patients are often in semi-stable employment sectors **Finally, income levels** were mainly middle class in both groups aligning **with Salah et al. (2020),** who noted that colorectal cancer affects middle-income populations significantly.

Regarding Present history and clinical data: The current study showed that the majority of the patients in both groups were in stage II of colorectal cancer, representing more than one third respectively in the study and control group. This result is consistent with **Mohamed et al. (2019)** and **Youssef et al. (2017),** who found similar staging patterns. In contrast, **Hamdy et al. (2016)** reported a higher frequency of Stage III and IV among their patients due to later diagnosis .The sigmoid colon was the most affected site which matches the anatomical predisposition to colorectal cancer due to stasis and narrow lumen. This aligns with findings from **El-Sayed et al. (2018)** and **Farag et al. (2020)**.Parenteral feeding was most common .supporting **Nassar et al. (2021)** who reported that surgical patients with delayed motility often require such support. **Regarding Smoking** was reported by over one-third in both groups, consistent with **Zaki et al. (2017),** who linked CRC to tobacco exposure. No alcohol or drug abuse was reported, reflecting cultural norms. **Regarding family history** was most prevalent for hypertension followed by diabetes and heart disease. These comorbidities are well known to co-occur with colorectal cancer. The current study found no significant difference between the Study and Control groups in terms of weight and height. The weight range for the Study group was 75–124 kg, while the Control group had a range of 78–122 kg, with mean weights of 95.45 ± 15.39 kg and 91.34 ± 16.95 kg, respectively. The t-test revealed no statistically significant difference between the groups ($p = 0.374$), indicating that the weight distributions were similar in both groups. This is consistent with previous studies such as **Mohamed et al. (2019) and Youssef et al. (2017),** who reported no

significant variations in weight among similar patient populations. Similarly, the height of participants in the Study group ranged from 162 to 191 cm, while the Control group ranged from 165 to 189 cm. The mean height for the Study group was 176.47 ± 8.65 cm, compared to 175.24 ± 7.63 cm in the Control group. Again, no significant difference was found (p = 0.596), suggesting that the two groups had comparable height measurements. This finding is in agreement with **El-Sayed et al. (2018) and Farag et al. (2020),** who observed no major differences in height between groups in their studies. These results support the conclusion that both weight and height distributions were comparable between the Study and Control groups, which is contrary to findings by **Hamdy et al. (2016),** who observed variations in these measurements among their patients, likely due to differing demographic factors.

Regarding to Eating habits, all patients in the study group reported eating three times per day, compared to only half in the control group, showing a highly statistically significant difference. This may be attributed to dietary counseling provided during the intervention phase, emphasizing structured meals. **Ahmed et al. (2020)** confirmed that structured meal advice increases adherence while **Salem & Youssef (2019)** found that discomfort may lead to skipped meals.

One third of the study group and more than half of the control group reported appetite changes, with appetite changes in the control group could be due to unmanaged side effects like nausea, while the study group benefitted from early intervention, in agreement with **Hegazy (2021)**.all patients in the study group reported snacking habits, versus only. This supports the idea that snacking helps maintain caloric intake and is effective postoperatively.

Also, regarding feeding pattern**,** it was found that parenteral feeding was more common among both groups, with slightly higher percentage in the control group. This may be due to the impaired gastrointestinal motility and poor appetite observed among colorectal cancer patients undergoing surgery. Additionally, smoking was reported among over one-third of both groups, which may have contributed to the poor nutritional status and delayed wound healing post-surgery. These findings are consistent with the study conducted by **Abdallah et al. (2021),** which demonstrated that most patients with colorectal cancer were diagnosed at stage II or III, and smoking history was prevalent among them. Moreover, a review by **Sung et al. (2021)** confirmed that sigmoid and descending colon are the most

common tumor sites, particularly in older adult males.

The findings revealed a significant improvement in hemoglobin levels in the study group, increasing from 48% on day 1 to 92% on day 4 (p = 0.005), indicating effective postoperative nutritional and medical care. In contrast, the control group showed minimal improvement (p = 0.497), reflecting the impact of intervention. (**Kamal et al. 2018)** highlighted that proper perioperative care leads to rapid hemoglobin normalization .Similarly, total lymphocytic count (TLC) improved from in the study group, with statistical significance, suggesting enhanced immune response. This finding is in agreement **with Farid & Lotfy (2020),** who reported that adequate nutrition boosts TLC in surgical patients .WBCs and RBCs showed a gradual, non-significant increase in the study group. **Omar et al. (2019)** explained that such indices may take longer than four days to reflect significant changes due to their dependence on overall systemic recovery, white blood cells (WBCs), red blood cells (RBCs), and hematocrit (HT) showed no statistically significant difference between groups these findings are refused as indicators of interventional effectiveness. This may be due to the fact that these parameters are influenced by multiple perioperative factors including fluid status, medication, or inflammation, and may require a longer recovery period to normalize.

Regarding, Kidney function tests, percentage of patients with normal serum creatinine increased from 44% to 60% in the study group, while the control group showed only a moderate rise. Although statistically non-significant, this trend suggests better renal perfusion and fluid management in agreement with **Rashed et al. (2017)** reported similar findings in patients receiving guided hydration therapy. **Regarding to Blood urea** also decreased in the study group one third reflecting metabolic stabilization postoperatively. **Barakat & Elmasry (2021**) emphasized that protein catabolism often affects early urea levels, and correction may take time. **Regarding to Serum protein** improved from 40% to 72% normal in the study group, indicating improved nutritional status. Albumin also rose from 44% to 64%, though not significant. These changes reflect early signs of nutritional recovery, which are in line with **Rashed et al. (2017)**.

Regarding to Serum electrolytes. There was a statistically significant improvement in serum sodium levels in the study group .This suggests effective correction of electrolyte imbalances through tailored IV fluid protocols**. Amin et al. (2020)** reported similar patterns in patients with

colorectal surgeries. **As concern** Potassium levels also showed significant improvement in the study group. Hypokalemia correction is crucial for preventing postoperative ileus and cardiac arrhythmias. **Naguib et al. (2022)**. highlighted the importance of potassium monitoring in early recovery Chloride and calcium did not change significantly in either group, which might be due to their stable baseline levels and lower sensitivity to short-term correction.

Regarding to Knowledge about cancer knowledge scores revealed no significant difference between study and control groups While one third of the study group had high knowledge, half had moderate and one third had low. The control group had similar distribution. This reflects baseline awareness levels that might have developed through passive information sources in agreement with **Soliman & Khaled (2018)** noted that patients' knowledge often stems from informal education, with limited impact from one-time sessions. On the contrary, **Ashraf et al. (2020)** demonstrated that structured educational interventions with follow-up produce more noticeable improvements.

Regarding to Dietary pattern, the current study revealed all patients in both groups received dietary advice, and the majority followed a prudent diet after diagnosis. This reflects positive responsiveness to medical counseling, particularly from doctors who were cited as the main source, approximately, three quarter of patients reported changing their diet based on the advice received, and more than half showed a strong interest in learning more about healthy eating. This suggests that when patients are properly informed and supported, their motivation to adopt healthier habit simproves. These findings are in line with **Fouad et al. (2019)**, who emphasized that patient behavior is heavily influenced by trusted healthcare provider , also **Younis (2021)** found that medical professionals were key motivators for dietary compliance in cancer survive

Regarding to Post-operative outcomes the current study Postoperative outcomes revealed that only one third of patients experienced non-infective complications, one third had infective ones. The majority of patients were discharged within seven days, and the survival rate at three years post-surgery was majority which is an excellent outcome. These due to the effectiveness of integrated perioperative care, including early mobilization, infection control, and nutritional management consistent with **Ismail et al. (2020**) support these findings, showing that enhanced recovery protocols significantly reduce complications and length of stay. **In**

contrast, Ezzat & Hamdy (2022) documented worse outcomes in institutions without structured care pathways

Regarding to wound healing the current study showed Wound healing assessment showed that more than half of wounds were closed, mostly by suture and less than one quarter on clips, while majority of all wounds were completely healed. This high rate of wound closure and healing reflects effective surgical techniques and supportive care. This finding in line with **Abdurrahman (2019)** that revealed the role of wound closure methods and sterile dressing techniques in achieving favorable healing outcomes. While, **Mahmoud et al. (2021)** noted that comorbidities such as diabetes could delay healing, which might explain the 8% of cases where wounds had not yet healed

Regarding to Clinical sepsis indicators: Sepsis-related indicators were present in varying degrees. Fever >38°C was noted in one third of patients, hypotension (SBP < 90 mmHg) in one quarter , and oliguria in one half . White blood cell abnormalities were limited to minority (low) and less than of one quarter (high), while two third of patients had a neutrophil/lymphocyte ratio < 3, suggesting a mild or well-controlled inflammatory response. This finding in agreement with **(Puzzono, M., et.al 2021)** identified fever and oliguria as early warning signs of sepsis in postoperative patients also found **(Ibrahim et al. 2021)** also emphasized the predictive value of the neutrophil/lymphocyte ratio in detecting systemic infection, which was mostly within a safe range in this study

Riad et al. (2022) also observed that early ambulation and nutritional care help reduce such complications.

Regarding to Nutrition knowledge the current study revealed Post-teaching assessment showed that more than half of the study group had complete nutrition knowledge, compared to half in the control group. However, the difference was not statistically significant. This suggests that while education had some positive effect, more intensive or repeated sessions may be needed for a stronger impact. **Fathi et al. (2018)** emphasized that structured and repeated educational interventions are more effective in enhancing nutrition knowledge.(**Badran 2020)** highlighted that the content and delivery method of educational programs influence their success. This finding contradicts studies such as **Isenring et al. (2021) and Power et al. (2022),** who confirmed that structured nutrition education leads to significant improvements in patients' understanding of the role of diet in

recovery and cancer prevention. These authors refuse the idea that nutritional knowledge can remain unchanged if education is delivered effectively.

In relation to Methods of feeding: The majority of the study group received oral feeding postoperatively compared to in the control group, with a statistically significant difference (p = 0.032). Early initiation of oral feeding is associated with better outcomes in gastrointestinal surgery recovery. This is in line with **Zohdy & Elmasry (2019)** supported this approach, citing improved healing and reduced complication rates with early oral intake **Kareem et al. (2021)** cautioned, however, that feeding plans should be.

These findings are accepted as evidence of the successful implementation of enhanced recovery protocols (ERAS), which prioritize early return to oral intake. This is strongly supported by **(Salem & Youssef, 2019**). Who emphasized that early oral feeding promotes faster bowel recovery, reduces postoperative complications, and enhances overall outcomes. They accept oral feeding as a key component of best practices in colorectal surgical care.

Conclusion:

Based on the findings of the present study, it can be concluded that:

Colorectal cancer is a leading cause of cancer-related morbidity and mortality worldwide. However, postoperative complications and delayed healing remain significant challenges. Nutrition plays a vital role in improving surgical outcomes and enhancing recovery. The findings of this study strongly demonstrate the pivotal role of preoperative nutritional education in enhancing postoperative clinical outcomes among patients undergoing colectomy surgery for colorectal cancer.. By implementing a structured nutritional teaching program before surgery, patients were better prepared physiologically and psychologically for the operative process had positive effect.

The study group that received nutritional guidance exhibited significantly improved wound healing, reduced incidence of postoperative complications such as sepsis and gastric motility disorders, and

The study group that received nutritional guidance enhanced knowledge and practice regarding dietary requirements. These improvements suggest that empowering patients with nutritional knowledge preoperatively is not only feasible but also essential for optimal recovery and improved quality of life post-surgery.

Furthermore, the intervention promoted patient autonomy, improved dietary compliance, and helped patients recognize early

warning signs of complications, facilitating timely medical intervention when needed.

Recommendations:

For patients

-Follow Nutritional Guidance: It is crucial to follow the dietary guidelines provided by your healthcare team. A balanced diet rich in fruits, vegetables, whole grains, and fiber, while minimizing processed meats, can significantly improve your overall health and reduce the risk of cancer recurrence. High-fiber foods are particularly beneficial for colon cancer recovery.

-Participate in Preoperative Nutritional Education: Before your surgery, we strongly encourage you to engage in nutritional education programs. These programs will provide you with essential knowledge about diet adjustments before surgery. Proper nutrition before your procedure can help reduce the risk of complications, such as infections or delayed wound healing.

-Engage in Postoperative Nutritional Counseling: After surgery, attending follow-up nutritional counseling sessions is essential. Your diet will be crucial during recovery to ensure you meet your nutritional needs, manage any side effects from the surgery, and support the healing process of your colon.

-Maintain Hydration and Proper Nutrition: Staying hydrated and consuming nutrient-dense meals is vital during your recovery. Focus on foods that are rich in vitamins, minerals, and fiber. Proper nutrition supports the healing of your digestive system and boosts your immune function, which is critical after colon cancer treatment.

-Monitor for Signs of Malnutrition: Keep an eye on any signs of malnutrition, such as fatigue, weakness, or unintentional weight loss. Follow a Personalized Nutritional Plan: You should follow a personalized nutritional plan, developed in consultation with a registered dietitian. This plan should be specifically designed based on your medical history, treatment plan, and any other health factors related to colon cancer.

-Engage in Regular Physical Activity: With approval from your healthcare team, engage in light physical activity. Physical activity helps maintain muscle mass, enhances digestion, and promotes overall recovery after colon cancer surgery.

-Avoid Self-Medication or Unverified Diets: Avoid extreme diets or taking supplements without the approval of your healthcare provider. Some unverified supplements or treatments may interfere with your colon cancer treatment or recovery process.

-Stay Informed About Colon Cancer Prevention and Diet: Stay informed about how your diet can affect the prevention of colon cancer and its recurrence. Regular communication with your healthcare provider about dietary changes is essential for long-term health.

Recommendations for Future Long-Term Nutritional Maintenance:

-Future patients should prioritize a balanced, high-fiber diet to prevent colon cancer recurrence and reduce the risk of other chronic diseases. This includes increasing the intake of whole grains, fruits, vegetables, and lean proteins while minimizing red meat and processed foods.

-Regular Health Monitoring: Ongoing health monitoring through regular check-ups, including nutritional assessments, cancer screenings, and early detection of possible complications related to colon cancer treatment, is critical to managing long-term health.

-Adopt Healthier Lifestyle Modifications: We encourage patients to adopt lifestyle changes such as maintaining a healthy weight, engaging in regular physical activity, and avoiding smoking or excessive alcohol. These lifestyle changes are important for reducing the risk of colon cancer recurrence and improving overall health.

-Psychological and Emotional Support: Cancer recovery, particularly from colon cancer, can be emotionally challenging. Recommend seeking psychological support when needed. Therapy, support groups, and counseling can help you maintain mental and emotional resilience during recovery.

-We are committed to supporting you throughout your journey, and we are here to assist you in managing your health effectively. **Continued Education on Cancer and Nutrition** Patients are advised to continue educating themselves about the relationship between cancer, nutrition, and lifestyle. This ongoing learning will empower patients to make informed decisions about their health and treatment plans.

-Proactive Approach to Cancer Prevention

Future patients should take a proactive approach to cancer prevention by adhering to evidence-based guidelines on diet, exercise, and screening. Regular screening can help detect potential health issues early and lead to better treatment outcomes.

-Adherence to Treatment and Follow-up Care

Future patients are urged to adhere strictly to their treatment regimen, follow prescribed medications, and attend follow-up care appointments. Consistent medical follow-up helps

ensure that any complications are detected early and managed effectively.

-Personalized Nutritional Plans for Lifelong Health

ongoing consultations with a dietitian or nutritionist are essential for developing personalized nutritional plans that are suitable for life after surgery. These plans should evolve over time based on the patient's health status, lifestyle, and cancer risk.

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