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Effect of Nutritional Educational Intervention on Improving Dietary Habits among Recovering Colorectal Cancer patients

Magda M. Mohsen[1], Wafaa H. Abdullah[2], Thanaa A. El Kholy[3], Hatim Al-Abbadi[4]

Professor of Community Health Nursing, Faculty of Nursing-Menoufia University Egypt[1]
Ass. Prof. Medical surgical Nursing, Faculty of Nursing, Menoufia University, Egypt [2]
, Professor of Clinical Nutrition, Faculty of Home Economics, Al- Azhar University3
Consultant General Laparoscopic Surgeon, Faculty of Medicine, King Abdulaziz University[4],
Corresponding author: Dr. Wafaa H. Abdullah
E-mail: wafaaabdullah21@gmail.com

Abstract: **Medical conditions, including ulcerative colitis or colon cancer, may necessitate a colectomy. The impact of a colectomy on patient's diet depends on how much of the colon remains after surgery. Total colectomy requires significant adjustment of eating habits and fluid intake. Nutrient deficiencies may occur after intestinal surgery due to mal-absorption, poor dietary intake, intestinal losses Aim: to determine the effect of nutritional educational intervention on improving dietary habits among recovering colorectal cancer patients. Hypothesis: Patients who will receive the nutritional educational intervention are more likely to have better dietary habits than before the nutritional educational intervention. Design: Quasi experimental research design was utilized. Setting: Surgical departments "male and female "at King Abdul Aziz University Hospital, Jeddah, KSA. Sample: purposive sample consists of all patients admitted to King Abdulaziz University Hospital was selected "30 patients"; 17 males and 13 females who diagnosed as colorectal cancer. Tools: 1) a structured questionnaire to assess socio-demographic data, medical information and types of intervention for studied patients. 2) Bio-physiological measurement tool to examine the anthropometric measurement and bio-chemical Values before & after nutritional educational intervention. 3) 24 hours' Dietary recall was used to determine food history and dietary habits before & after nutritional educational intervention. Results: The total mean age was 51.96±1.02. A colon cancer represents 83.33% of cases whereas 16.66% had rectal cancer. A largest percent of the studied sample undergoing intervention with Surgery + chemotherapy and surgery was 43.33%, 26.66% respectively. A statistical significant difference was found between CEA, WBC, RBC, HCT, MCV, Platelet count, and Albumin for female of colorectal cancer patients. Conclusion: The nutritional educational intervention had better effect on improving dietary habits among recovering colorectal cancer patients. Recommendations: Developing strict written guidelines with colored pictures about prohibited, allowed nutrition and self-care for colorectal cancer patients.**

Keywords: **Nutritional Educational Intervention-Dietary Habits- Colorectal Cancer.**

1. INTRODUCTION

Colorectal cancer is the third most common type of cancer in men and the second most common in women, according to World Health Organization data **[1].** In industrialized countries, colorectal cancer is the first (South Korea), second (Japan) and third (USA and UK) most common cause of cancer-related death **[2].** While considering the fact that age is a major risk factor for colorectal cancer, this trend is expected to continue owing to the increase in the average human lifespan **[3].**

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Colorectal carcinoma can present as an emergency with bowel obstruction, perforation and bleeding requiring urgent surgical intervention. Some 10–30 per cent of patients with colorectal carcinoma present with acute obstructive symptoms Large bowel obstruction results in massive colonic distension, bacterial translocation, electrolyte and fluid imbalance, and an increased risk of colonic necrosis and perforation; urgent surgical decompression is needed. Large bowel obstruction is more common with left-sided lesions than with lesions of the right colon Emergency presentations of colorectal carcinoma are also associated with worse oncological outcomes and a higher incidence of local spread and metastatic disease **[4].** With regard to all aspects of the perioperative period, laparoscopic surgery and the application of the ERAS protocol share the same goals: improving the surgical outcome, reducing postoperative surgical stress and length of hospital stay **[5].**

Colorectal cancer (CRC) is the third most common cancer worldwide after lung and breast cancers with two-thirds of all colorectal cancers occurring in the more developed regions of the world **[6&7].** CRC affects men and women of all racial and ethnic groups, and is most often found in those aged 50 years or older **[8].** Colonoscopy plays a central role in the detection and prevention of CRC **[9].**

Advances in cancer therapy are made by continual investigation and evaluation of treatment results and their incorporation in the practice of oncology. This requires comparisons between results and necessitates the availability of appropriate data in a suitable form. Thus, standardization of assessment and of reporting of results is an important step that aims at increasing the amount of usable therapeutic information at the disposal of the physician. It has therefore, become necessary to develop a "common language" to describe the results of cancer treatment and to agree upon internationally acceptable general principles for reporting and assessing data **[10].**

Previously, patients undergoing colorectal surgery received traditional perioperative care, which comprised sufficient mechanical bowel preparation, insertion of a nasogastric tube, preoperative fasting, and postoperative fasting for up to 1 week and multiple intra-abdominal drains. Eventually, early rehabilitation programs were developed to decrease postoperative pain, perioperative physiological stress, and organ dysfunction, and to promote patient motivation, leading to enhanced recovery after surgery; decreased postoperative morbidity, length of hospital stay, and health care resources; and improved overall outcomes. Since their first introduction in the mid-1990s, early rehabilitation programs, also known as fast-track pathways or enhanced recovery after surgery (ERAS), have become increasingly popular in the care for patients with colorectal surgery **[11].**

After treatment of colorectal cancer, the patient must eat foods that help maintain good health and prevent cancer recurrence. The colon cancer recovery diet should be filled with fruits, vegetables, whole grains, lean sources of protein and low-fat dairy. For cancer prevention, Johns Hopkins recommends the patients to get 10 servings of fruit, vegetables and whole grains a day, with one serving equal to one piece of fruit, 1/2 cup of chopped vegetables or one slice of whole-wheat bread. The antioxidants and phytochemicals found in these foods protect cells from damage and may help prevent tumor growth **[12].**

As regard significance diet; colon cancer patients may suffer from a variety of nutrition-related symptoms that affect health such as weight loss, anorexia and taste changes. Therefore, proper diet is essential for reducing symptoms and improving quality of life. A diet that consists of foods that will maintain a healthy weight and also prevent cancer advancement may be beneficial for cancer patients. Diet restrictions are not typically necessary unless recommended by a health care provider. Cancer patients should consult a registered dietitian for the healthiest food options based on your disease. Careful hand washing; when preparing and serving foods; when cooking and using olive oils or vegetable oils in place of butter, reading labels carefully when choosing a food product in order to determine the sodium and fat content. It has been recommended to colon cancer patients consume 6 to 8 glasses of water daily and exercise at least 30 minutes daily. If the patient requires a colon resection or colostomy, the doctor may recommend additional diet changes as the patient will need to eat small meals five to eight times daily, explains Medline Plus, and avoid gassy foods such as beans and other legumes **[13].**

Although an individual's nutritional status may be compromised initially by the diagnosis of cancer, thorough nutritional screening procedures and the timely implementation of nutritional therapies may markedly improve the patient's outcome. Symptoms and side effects may sometimes be managed by a combination of dietary and pharmacologic interventions. Several approaches to the intervention of cancer cachexia have been reported, and a variety of agents have been studied

for their effects on appetite and weight. The decision to use pharmacological intervention to improve a patient's appetite should be based on the patient's desires, current medical condition, and life expectancy **[14].**

Although anorexia is a common symptom of cancer patients, studies have shown that increased caloric intake either by the oral route or by supplementation with total parenteral nutrition has failed to counteract the wasting process. This supports the theory that the aberrant metabolic rate is the direct response by the tumor and the immune system to disrupt the pathways that regulate the homeostatic loop of body-weight regulation **[15].**

Undesirable weight gain may be an effect of chemotherapy intervention for early-stage cancers, possibly resulting from decreases in resting metabolism. Consequently, the eating practices of individuals diagnosed with cancer should be assessed throughout the continuum of care to reflect the changing goals of nutritional therapy **[16].** Tumor-induced weight loss occurs frequently in patients with solid tumors of the lung, pancreas, and upper gastrointestinal tract and less often in patients with breast cancer or lower gastrointestinal cancer **[17].**

Evidence indicates that intensive individualized nutritional counseling with regular foods, with or without supplements according to patients' requirements, increases nutritional intakes and prevents therapy-associated weight loss and intervention interruptions in cancer patients. Individualized counseling and the use of high-protein dietary supplements to increase dietary intake have become the standard recommendation by European Society for Clinical Nutrition and Metabolism guidelines for gastrointestinal and head-neck cancer patients undergoing radiotherapy with or without chemotherapy. This evidence is mostly supported by the results of our randomized controlled trials of nutritional therapy, in which a causal pathway between nutritional intervention and quality of life **[18 &19].**

Nutrition plays major (but not always fully understood) roles in many aspects of cancer development and intervention **[20].** Good nutrition practices can help cancer patients maintain weight and the body's nutrition stores, offering relief from nutrition impact symptoms and improving quality of life **[21].** Nutrition impact symptoms are those symptoms that impede oral intake. They include, but are not limited to, anorexia, nausea, vomiting, diarrhea, constipation, stomatitis, mucositis, dysphagia, alterations in taste and smell, pain, depression, and anxiety **[22].** Nutrition continues to play an integral role for individuals whose cancer has been cured or who are in remission. A healthy diet helps prevent or control comorbidities such as heart disease, diabetes, and hypertension. Following a healthful nutrition program might help prevent another malignancy from developing **[23].**

The nutritional status of patients diagnosed with cancer entering the intervention process varies. Not everyone begins therapy with anorexia, weight loss, and other symptoms of nutritional problems. For patients who have such symptoms, however, anticancer therapies can complicate the intervention and expected recovery. Many individuals also present with pre-existing comorbid diseases and illnesses that further complicate their intervention. Surgery, chemotherapy, and radiation can have a direct (or mechanical) and/or an indirect (or metabolic) negative effect on nutritional status. The success of the anticancer therapy will be influenced by a patient's ability to tolerate therapy, which will, in turn, be affected by nutritional status preceding intervention. The treating clinician should assess baseline nutritional status and be aware of the possible implications of the various therapies. Patients receiving aggressive cancer therapies typically need aggressive nutrition management **[24].**

Screening and nutrition assessment should be interdisciplinary; the healthcare team (e.g., physicians, nurses, registered dietitians, social workers, psychologists) should all be involved in nutritional management throughout the continuum of cancer care **[25].** Because nutritional status can quickly become compromised from illness and decreased dietary intake, and because nutritional well-being plays an important role in intervention and recovery from cancer, early screening and intervention as well as close monitoring and evaluation throughout all phases of cancer intervention and recovery are imperative in the pursuit of health for the individual with cancer **[24].**

Increasing national and international interest in patient education has emerged, and individuals are increasingly expected to exert more self-care **[26&27].** However, teachings to ensure those patients and their families are competent and confident have not been supplied **[28].**

Significance of the study:

Cancer incidence and mortality rates for 2012 by sex and for 10 age groups from 0–14, 15–39, 40–44, 45–49- 75 and over are estimated for the 184 countries or territories of the world having a total population greater than 200,000. Results are

presented for the following cancer sites or cancer types as defined by the 10th edition of the International Classification of Diseases (ICD-10): colon and rectum (including anus C18-21) **[29].**

Colorectal cancer is the fourth most common cancer in men and the third most common cancer in women worldwide **[30 &31].** Previous studies have reported rapid increases in colorectal cancer incidence rates, particularly in economically transitioning countries in many parts of the world, and these increases are thought to reflect changing dietary and physical activity patterns **[32, 33, 34, 35, 36, & 37].** However, these studies were limited because they were based on old data and examined regional or country-specific trends. No study published in a peer-reviewed journal has presented colorectal cancer incidence trends across all five continents **[38].**

Egypt is a developing Middle-Eastern country; Bolak Eldakror Hospital is a secondary-care governmental hospital in Giza, Egypt. The gastrointestinal endoscopy unit was set up in 1999 **[39].** Colorectal cancer (CRC) is the third most popular cancer in men and the second in women. The population of Saudi national for year 2010 was 18,707,576. There were 1033 cases of colorectal cancer accounting for 10.4% of all recently discovered cases in year 2010. This cancer ranked first among male population and third among female population. It affected 541 (52.4%) males and 492 (47.6 %) females **[40].**

Aim of the study:

Aim of the study to determine the effect of nutritional educational intervention on improving dietary habits among recovering colorectal cancer patients.

Research Hypothesis:

1. Patients who will receive the nutritional educational intervention are more likely to have better anthropometric measurements than before the nutritional educational intervention.
2. Patients who will receive the nutritional educational intervention are more likely to have better dietary habits than before the nutritional educational intervention.
3. Patients who will receive the nutritional educational intervention are more likely to have better biochemical analysis than before the nutritional educational intervention.
4. Patients who will receive the nutritional educational intervention are more likely to have better weight change than before the nutritional educational intervention.

2. SUBJECTS AND METHOD

Research design: A quasi experimental research design was utilized in this study to determine the effect of nutritional educational intervention on improving dietary habits among recovering colorectal cancer patients.

Setting: The study was carried out at surgical departments, Male & Female, King Abdulaziz University teaching affiliated hospital, Jeddah, KSA. The hospital has 845 beds with the addition of 157 beds dedicated for the critical care units and general & specialized clinics that exceeds two hundred clinics. With consistent generosity and support, it's now full capacity of 1002 beds. As regard general surgical in-patient departments; the hospital has two main surgical departments in the fifth floor one for males' and the other for female patients`; each has 30 beds. Each department provides care for different types of surgical operations and procedures.

Subjects:

Purposive sample was selected. The total sample size included in the study was 30 patients from the aforementioned settings. They have been admitted for colorectal surgery and were selected according to the following:

Inclusion criteria:

- Adult
- Both sexes
- Alert/Conscious
- Has no chronic illness
- Hemodynamically stable

Tool of the study:

Three tools were used for data collection;

1. **An Interviewing questionnaire:** It was developed by the researchers and it consists of data as; nationality, level of education, source of financial support, average house hold income, residence, location of primary tumor, any metastasis, family history, any chronic illness and type of intervention they have received to assess socio-demographic data, medical information and types of intervention for studied patients. Data were collected by the researchers at the initial data collection point. These variables were collected through the patient face-to-face interview developed by researchers.

2. **Bio-physiological measurement tool**: It consists of two parts;

a. **Anthropometric measurement** to examine height, weight and body mass index before & after nutritional educational intervention. Measuring the Body Mass Index. Body Mass Index (BMI) is defined as a clinical indicator of obesity; determined by dividing the weight in kilogram by height in meters squared = Weight (kg)/Height (m)2 **[41].** Patients are considered obese when BMI is ≥ 32.3 kg/m2 **[42].** In the present study, obesity is calculated based on the equation of BMI = Weight (kg) / Height (m)2 Body Mass Index was calculated by the following formula in which body mass index (BMI) = Weight (kg)/ Height (m)2 **[43].** It is measure used to all patients in the initial visit and follow up visit.

b. **Bio-chemical Values:** to examine the biochemical analysis before & after nutritional educational intervention. It includes carcinoembryonic antigen, differential diagnosis of complete blood count and kidney function tests as an initial screening tools.

3. **24 hours' dietary recall questionnaire:** to determine diet history and food habits before & after nutritional educational intervention. Food habits and dietary data were measured by using the 24 hours' dietary recall sheet. The 24 hours' dietary recall consists of record all foods patient eats, drink, appetite, use of vitamins & minerals, number of meals & snacks, drinking coffee or any caffeine beverages and exercise for a 24-hour period for 3 consecutive days. It was reported that coefficient alpha reliability of 0.92.

Procedure for data collection:

- The researcher started the data collection and implementation of the program from the beginning of November 2015 to end of January 2016

- **Approval: -** The official permission for conducting the study was obtained from the hospital directors. An exploratory phase was conducted before starting the study to determine the feasibility of accomplishing this study according the available resources.

- **Validity of tools:** A jury of seven experts reviewed the tools from academic staff; from the medical surgical nursing, community health nursing and from applied medical sciences clinical nutrition department, King Abdulaziz University. They were selected to test the clarity, feasibility and relevance of tools. The corrections were done accordingly based on their response.

- **Reliability of the tool**: The reliability co-efficient regarding the study tools, the researcher repeated the reliability co-efficient; the Cronbach's alpha of the tools was showed 0 .798. Hence the study tools indicate good reliability for conducting the research study. As regard reliability of the 24 hours' dietary recall was done by test-retest for measuring internal consistency. The Cronbach's alpha of the tool was 0.92 indicate good reliability.

- **Pilot study**: A pilot study was carried out on 10% of the subjects. Tools were tested in the previously mentioned setting in order to be revised for clarity, understanding, comprehensiveness, practicability, applicability, feasibility and ease of implementation, detecting obstacles and problems that may be encountered during data collection. It also helped to estimate the time needed to fill in the study tools. Data collected from the pilot study were analyzed. The researcher has excluded the piloted data from the sample size participating in the study.

- **Ethical Considerations:**

An official permission was obtained from the hospital administration. Each participant signed a consent paper attached to the beginning of the questionnaire given which gave a brief explanation about the study and its aim. Privacy, and

confidentiality is ensured to all participants plus honesty where the researcher will provide each participant with a contact address to know the results of the study after the research study is over if they want to do so.

- Subjects were selected according to the selected criteria. Also written consent was obtained from the subjects and confidentiality was assured

- The implementation of the intervention was carried out in the patient room in the surgical department. Methods and media of teaching used in the training sessions: lectures, discussions, booklet and demonstration. Pictures, videos and colored booklet.

- **Nutritional Educational Intervention:** subjects were given nutritional intervention for 5 sessions about diet. Three sessions started before colorectal treatment at hospital and two sessions after colorectal treatment ―two sessions / week. Each session lasted from 30 - 45 minutes. It included health education about mild to moderate dietary restrictions (i.e., in the range of 1200 to 2000 calories per day according gender) to promote healthy weight and weight loss in obese patient. Patients` were also encouraged to consume healthy diet appropriate for their health condition. Patients` were encouraged to move toward colon cancer recovery diet should be filled with fruits, vegetables, whole grains, lean sources of protein and low-fat dairy. Also foods that help maintain good health and prevent cancer recurrence.

- **After intervention,** assessment for dietary habits, anthropometric measurements, and biochemical analysis was conducted throughout two assessments: a) before intervention and b) six months after intervention by using the same tools"2 &3". The evaluation was filled by the researcher within 20-30 minutes to determine the effect of nutritional educational intervention on improving dietary habits among recovering colorectal cancer patients.

Statistical analysis:

The data has been analyzed using SPSS version 16. SPSS is a comprehensive system for analyzing data. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distributions and trends, descriptive statistics, and complex statistical analysis. Data was represented as frequencies, percentages, and mean ± standard deviation, chi square, p for F test and t: paired t-test were used.

3. RESULTS

Table (1): This table shows that two thirds of the study sample was non Saudi, 30% of them were illiterate while half of them their financial support was from their job.

Table (2): This table revealed that minority of the studied subjects their intervention was surgery and radiotherapy as well while almost half of them the intervention received was surgery and chemotherapy.

Table (3): This table revealed that most of the primary cancer was in colon, the majority of them did not have a family history of cancer while 30% & 30% of them had surgery before and taking medication regularly respectively.

Table (4): This table stated that the mean age for the studied sample was 51.96±1.02; as regard female group the mean weight was 86.53±2.44 before nutritional educational intervention while reduced into 76.07±2.01

6 months after nutritional educational intervention.

Table (5): This table revealed that 63.33% of the studied group did not skip any meals while the majority were drinking coffee or any caffeine beverages.

Table (6): This table stated that only 30% of the studied group did not skip any meals while less than two thirds were drinking coffee or any caffeine beverages.

Table (7): This Table shows that there was a statistically significant difference as regards appetite, meal skipping, drinking caffeine and performing physical exercise before and after the intervention. P value <0.05 While there was no statistically significant difference as regards having snacks or taking vitamins before and after the intervention p value>0.05

Figure1: This table revealed that the breakfast meal was the higher 46.7% in skipping meals after treatment than before treatment 3.3%.

Figure2: This table shows that grade 3, 4 & 5 of the appetite had been increased after intervention.

Figure3: This table reported that 86.6% were drinking caffeine before nutritional educational intervention and it had been reduced to 63.3% after nutritional educational intervention.

Table (8): This table revealed that there is a statistical significance difference with male and female group regarding biochemical values about carcinoembryonic antigen before and after the nutritional educational intervention.

Table (1): Distribution of Socio-Demographic Characteristics of studied sample (N= 30)

Socio-demographic characteristics	Male (n=17)	%	Female (N=13)	%	All (N=30)	%
• Nationality						
Saudi	5	29.4	5	38.5	10	33.3
Non Saudi	12	70.6	8	61.5	20	66.7
• Level of education						
Illiterate	5	29.4	4	30.7	9	30.0
Elementary	2	11.8	3	23.1	5	16.7
Intermediate	1	5.9	0	0.0	1	3.3
High School	4	23.5	3	23.1	7	23.3
Bachelor's degree	4	23.5	1	7.7	5	16.7
Diploma	1	5.9	2	15.4	3	10.0
• Source of financial Support						
Job	11	64.7	4	30.7	15	50.0
Husband/ wife	1	5.9	6	46.2	7	23.33
Parents	1	5.9	0	0.0	1	3.33
Other relatives	1	5.9	2	15.4	3	10.0
Other	3	17.6	1	7.7	4	13.34
• Average household income						
<1000	2	11.8	1	7.6	3	10.0
1000 to 3000	8	47.0	5	38.5	13	43.33
3000 to 6000	2	11.8	2	15.4	4	13.34
> 6000	5	29.4	5	38.5	10	33.33
• Residence						
Separate	6	35.3	7	53.8	13	43.33
Shared	11	64.7	6	46.2	17	56.67

Table (2): Distribution of tumor location and type of treatment for colorectal cancer patients

Parameters	Male (n=17)	%	Female (N=13)	%	All (N=30)	%
Location of the tumor						
Colon	13	76.5	12	92.3	25	83.33
Rectum	4	23.5	1	7.7	5	16.67
Which type of treatment did you receive						
Surgery	4	23.5	4	30.8	8	26.66
Chemotherapy	1	5.9	3	23.1	4	13.33
Surgery + chemotherapy	8	47.0	5	38.4	13	43.34
Surgery + Radiotherapy	1	5.9	0	0.0	1	3.33
Chemotherapy + Radiotherapy	3	17.7	1	7.7	4	13.33

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Table (3): Medical Information of studied sample of colorectal cancer patients before intervention

Medical Information	Male (n=17)	%	Female (N=13)	%	All (N=30)	%
What is the location of your primary tumor						
Colon	13	76.5	12	92.3	25	**83.33**
Rectum	4	23.5	1	7.7	5	**16.67**
Do you have evidence of cancer spread (metastasis)						
No	14	82.4	9	69.2	23	**76.67**
Yes	3	17.6	4	30.8	7	**23.33**
If you do have metastasis, please check if any of the following areas are affected						
No	14	82.4	11	84.6	25	**83.33**
Liver	2	11.8	0	0.0	2	**6.67**
Lung	0	0.0	1	7.7	1	**3.33**
Liver+ lung	1	5.9	1	7.7	2	**6.67**
Does anyone of your family was diagnosed with colorectal cancer						
No	17	100	11	84.6	28	**93.33**
Yes	0	0.0	2	15.4	2	**6.67**
Have you had any surgery						
No	14	82.4	7	53.8	21	**70.0**
Yes	3	17.6	6	46.2	9	**30.0**
Do you take any medication regularly						
No	13	76.5	8	61.5	21	**70.0**
Yes	4	23.5	5	38.5	9	**30.0**

Table (4): Anthropometric Measurements of colorectal cancer patients (M±SD)

Anthropometric Measurements	Male (n=17) M±SD		Female (n=13) M±SD		All	
Age	54±1.93		49.30±1.11		51.96±1.02	
Before Nutritional Educational Intervention						
Weight (kg)	72.11±1.65		86.53±2.44		78.36±1.12	
Height (cm)	170.76±7.64		161.61±6.15		166.8±8.31	
Body Mass index	24.25±0.21		32.93±0.55		28.01±0.25	
After Nutritional Educational Intervention						
Weight (kg)	69.54±1.66		76.07±2.01		72.37±1.66	
Height (cm)	170.76±7.64		161.61±6.15		166.8±8.31	
BMI	23.76±0.14		29.3±0.36		26.16±0.16	
Weight change	12.17±0.2		13.23±0.51		12.63±0.18	
Weight Loss	13.61±1.83		15.05±1.75		14.24±1.06	
Weight change duration						
	No	%	No	%	No	%
None	0	0.0	1	7.6	1	3.3
1 month	4	23.5	0	0.0	4	13.3
3 months	9	53.0	6	46.2	15	50.0
6 Months	4	23.5	6	46.2	10	33.4
Total	17	100	13	100	30	100

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Table (5): Food History and Dietary Habits of Colorectal Cancer Patients Before Intervention

Food History and Dietary Habits	Male (n=17)	%	Female (N=13)	%	All (N=30)	%
Appetite						
1	7	41.2	4	30.8	11	36.66
2	1	5.9	3	23.1	4	13.33
3	1	5.9	0	0.0	1	3.33
4	0	0.0	0	0.0	0	0.0
5	8	47.1	6	46.2	14	46.66
Use of vitamins / minerals						
Do not Use	15	88.2	9	69.2	24	80.0
Vitamin B	0	0.0	2	15.4	2	2.66
Iron	1	5.9	0	0.0	1	3.33
Multivitamin	1	5.9	2	15.4	3	10.0
Do you take all your meals regularly						
Yes	11	64.7	8	61.5	19	63.33
No	6	35.3	5	38.5	11	36.66
If no what meal do you usually skip						
Do not skip	12	70.6	7	53.8	19	63.33
Breakfast	1	5.9	0	0.0	1	3.33
Lunch	0	0.0	2	15.4	2	6.66
Dinner	4	23.5	4	30.8	8	26.66
Do you snack						
Yes	7	41.2	8	61.5	15	50.0
No	10	58.9	5	38.5	15	50.0
Do you drink coffee or any caffeine beverages						
Yes	15	88.2	11	84.6	26	86.66
No	2	11.8	2	15.4	4	13.44
What kind						
Tea	10	58.8	8	61.5	18	60.0
Coffee	7	41.2	4	30.8	11	36.66
Tea+ coffee	0	0.0	1	7.7	1	3.33
Do you exercise						
Yes	14	82.4	6	46.2	20	66.66
No	3	17.6	7	53.8	10	33.33

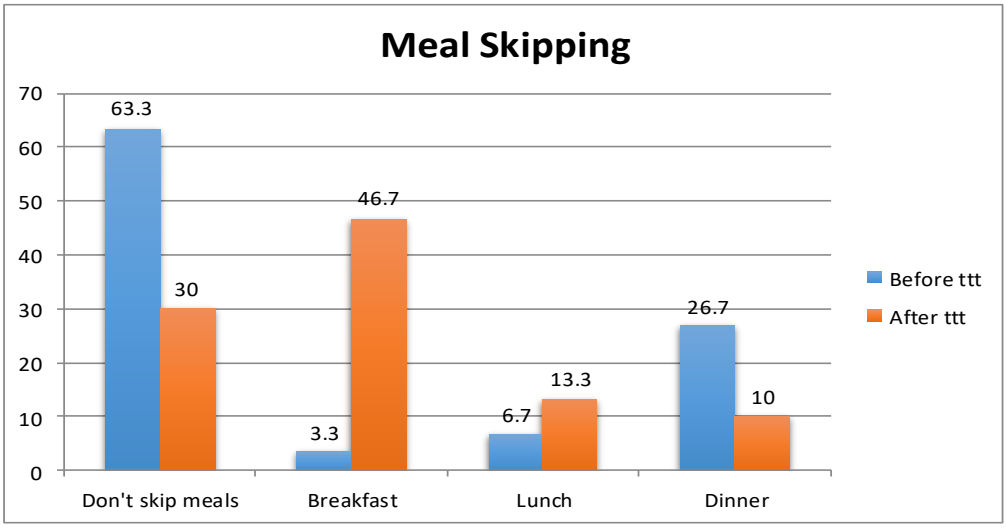

Figure (1) skipping meals before and after treatment among studied sample

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Table (6): Food History and Dietary Habits of Colorectal Cancer Patients After Intervention

Diet History and Food Habits	Male (n=17)	%	Female (N=13)	%	All (N=30)	%
Appetite						
1	2	11.8	2	15.4	4	13.33
2	1	5.9	0	0.0	1	3.33
3	4	23.5	1	7.7	5	16.66
4	1	5.9	3	23.1	4	13.33
5	9	52.9	7	53.8	16	53.33
Use of vitamin / minerals						
Do not	16	94.1	10	76.9	26	86.66
Vitamin B	0	0.0	2	15.4	2	6.66
Ca	1	5.9	0	0.0	1	3.33
Ca and vitamins	0	0.0	1	7.7	1	3.33
Do you take all your meals regularly						
Yes	11	64.7	8	61.5	19	63.33
No	6	35.3	5	38.5	11	36.66
If no what meal do you usually skip						
Do not skip	5	29.4	4	30.7	9	30.0
Breakfast	7	41.1	7	53.9	14	46.7
Lunch	3	17.7	1	7.7	4	13.3
Dinner	2	11.8	1	7.7	3	10.0
Do you snack						
Yes	8	47.1	9	69.2	17	56.66
No	9	52.9	4	30.8	13	43.33
Do you drink coffee or any caffeine beverages						
Yes	11	64.7	8	61.5	19	63.33
No	16	35.3	5	38.5	11	36.66
What kind						
Tea	8	47.1	5	38.5	13	43.33
Coffee and tea	2	11.8	4	30.8	6	20.0
None	7	41.2	4	30.8	11	36.66
Do you exercise						
Yes	8	47.1	4	30.8	12	40.0
No	9	52.9	9	69.2	18	60.0

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Table (7): Food History and Dietary Habits of studied sample of colorectal cancer patients before and after intervention

Food History and Dietary Habits	Before		After		Test	P value
	All (N=30)	%	All (N=30)	%	Chi square	
Appetite						
1	11	36.7	4	13.4	9.8437	0.043
2	4	13.3	1	3.3		
3	1	3.3	5	16.7		
4	0	0.0	4	13.33		
5	14	46.7	16	53.33		
Use of vitamins / minerals						
Do not Use	24	80.0	26	86.7	1.08	0.78
Vitamin B	2	6.67	2	6.7		
Iron	1	3.33	1	3.3		
Multivitamin	3	10.0	1	3.3		
Do you take three meals regularly						
Yes	19	63.33	19	63.3		
No	11	36.66	11	36.7		
If no what meal do you usually skip						
Do not skip	19	63.3	9	30.0	17.77	0.00048
Breakfast	1	3.3	14	46.7		
Lunch	2	6.7	4	13.3		
Dinner	8	26.7	3	10.0		
Do you snack						
Yes	15	50.0	17	56.7	0.268	0.604
No	15	50.0	13	43.3		
Do you drink coffee or any caffeine beverages						
Yes	26	86.6	19	63.3	4.35	0.037
No	4	13.4	11	36.7		
What kind						
Tea	18	60.0	13	43.3	10.61	0.005
Coffee	11	36.66	6	20.0		
Tea+ coffee	1	3.33	11	36.7		
Do you exercise						
Yes	20	66.7	12	40.0	4.29	0.038
No	10	33.3	18	60.0		

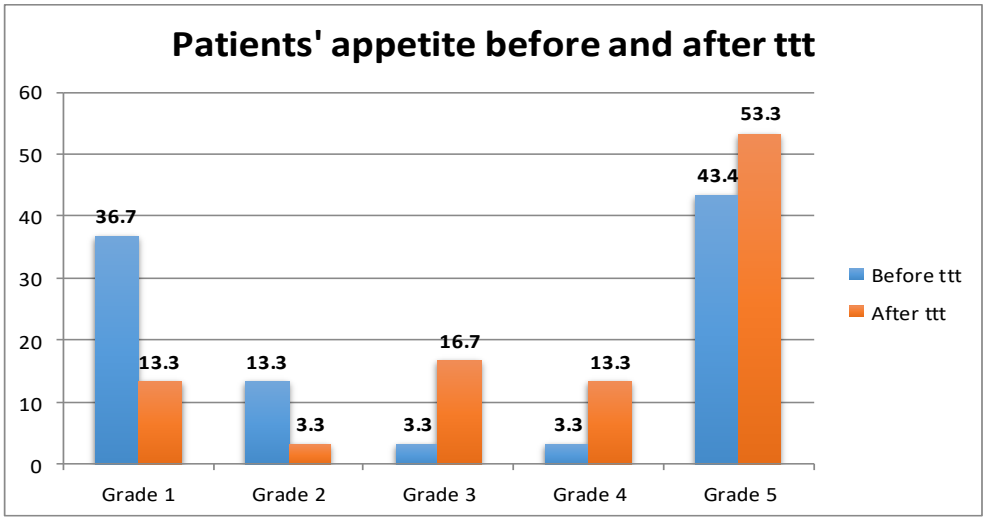

Figure2: Comparison Between Appetite before and after intervention

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Table (8): Biochemical Values for Male and Female of Colorectal Cancer Patients Before and After Treatment

Biochemical values	Male (N=17)				Female (N=13)			
	Before Mean ± SD	After Mean ± SD	T. value	P	Before Mean ± SD	After Mean ± SD	T. value	P
CEA	4.8±0.01	5.81±0.04	2.68	P<0.05*	2.92±0.11	3.22±0.21	2.29	*
WBC	6.72± 0.96	6.92±0.73	0.21	NS	7.61±0.03	9.15±0.39	1.94	*
RBC	4.39±0.77	4.25±0.58	0.78	NS	4.2±0.43	3.97±0.54	2.31	*
HB	15.83±1.6	12.08±1.11	2.41	*	10.7±1.53	10.66±1.10	1.61	NS
HCT	35.86±1.74	36.14±1.45	0.95	NS	31.93±1.32	38.06±1.73	2.83	**
MCV	82.25±2.35	85.54±4.51	0.17	NS	74.02±1.56	82.89±4.5	3.16	**
MCH	27.05±0.15	28.71±1.49	1.64	NS	25.5±0.11	27.04±1.2	1.34	NS
Platelet count	280.52±10.33	257.35±6.58	2.37	*	298.61±10.76	255.84±9.7	4.15	***
Albumin	29.55±0.06	33.67±1.2	2.18	*	32.3±0.79	25.07±1.12	2.64	**
Urea	5.09±0.77	4.62±1.82	3.01	*	3.86±0.12	4.14±3.47	1.17	NS
Na	136.05±3.28	137.35±2.95	0.65	NS	135.55±3.24	137.23±4.81	1.5	NS
Creatinine	82.64±2.83	80±19.55	1.59	NS	69.23±2.07	55.23±22.84	2.44	*
K	4.61±0.25	3.78±0.42	1.91	*	3.64±0.38	3.86±0.34	1.34	NS
Cl	99.05±4.22	101.58±3.75	0.46	NS	99.11±3.12	99.46±4.92	0.23	NS

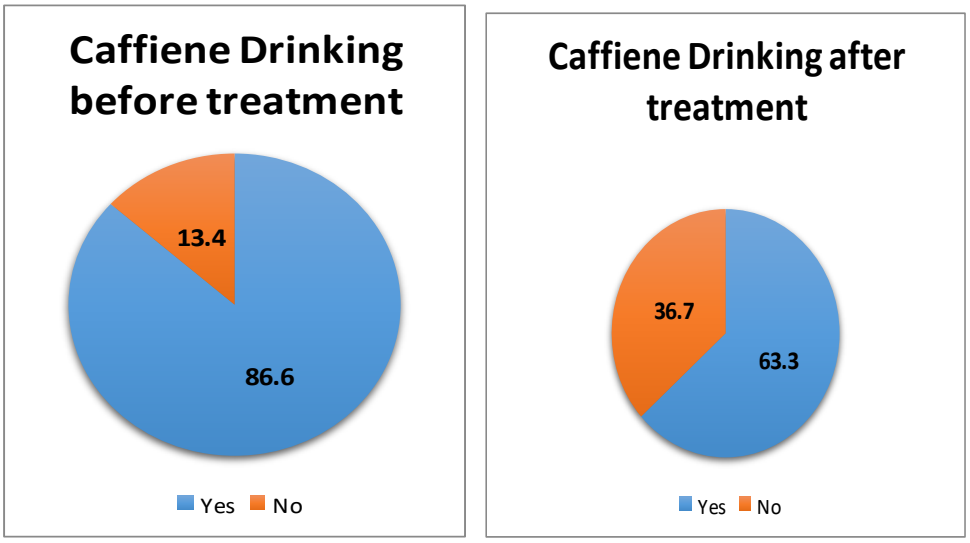

Figure 3: Percentage of Caffeine Drinking Before and After Intervention

4. DISCUSSION

According to **[44],** colorectal cancer is the third most common cancer type and the second most common cause of cancer death in the United States. Colorectal cancer risk can be lowered and ultimately prevented with proper levels of exercise and proper nutritional diet. The following are known risk factors for colorectal cancer: diet, obesity, lack of regular physical exercise, alcohol consumption, smoking, family history of colorectal cancer, and taking certain dietary supplements and medications There are conflicting results from the many studies that have examined the relationship between diet and colorectal cancer risk **[45].** The present study was conducted to determine the effect of nutritional educational intervention on improving dietary habits among recovering colorectal cancer patients.

According nationality the current study revealed that; one third of the studied group were Saudi nationality **(Table 1).** It is contradicted with **[39]** who studied "Colorectal cancer in Egypt that is commoner in young people: Is this cause for alarm?" and they reported that CRC is not uncommon among Egyptian patients subjected to colonoscopy. There are relatively higher CRC rates in patients under 40 years of age than reported in the West. This has implications relating to future epidemiological trends in Egypt. Physicians must have a greater awareness of the potential for CRC in young people in the Middle East. As regard of cancer spread (metastasis); the current study revealed that 6.7% of the male group had a liver metastasis **(Table 3).** This is parallel with **[46]** who studied "Severe hepatic sinusoidal obstruction associated with oxaliplatinbased chemotherapy in patients with metastatic colorectal cancer". Their results show that neo-adjuvant chemotherapy in patients with metastatic colon cancer may induce important sinusoidal obstruction associated with sinusoidal fibrosis and veno-occlusive lesions, occasionally with nodular regenerative hyperplasia. In their population, this effect was particularly marked in the livers of patients treated with protocols that included oxaliplatin. No such lesions were present in the resected livers from patients who had been treated by surgery alone. Also liver metastasis is the most common complication from colorectal cancer and a major contribution to mortality due to this disease. Approximately 60% of patients with colorectal cancer develop metastases, and in ~30% the liver is the only site of metastatic involvement.

In addition, the colon cancer in the current study had a higher percentage among the studied group; female has the majority of colon cancer diagnosis with age of 49.30±1.11 **(Table 2 & 4).** It is similar to **[47]** who studied "A Comparative Study of Rectal and Colonic Carcinoma: Demographic, Pathologic and TNM Staging Analysis". They stated that Egyptian patients with rectal carcinoma are younger than those with colonic carcinoma with no significant difference in this sex ratio when data of colon and rectum were compared (*p* value 0.48). Also the age incidence in Egyptian patients is much younger than that reported in the west, where the mean age is about 65 years **[48].** This young age incidence in the series is probably due to the young age structure of the Egyptian population.

Answer Hypothesis No. 1:

Patients who will receive the nutritional educational intervention are more likely to have better anthropometric measurements than before the nutritional educational intervention.

Colorectal carcinoma **(**CRC) is a common cancer worldwide. CRC affects men and women of all racial and ethnic groups, and is most often found in people aged 50 years or older in developed countries. No age group is exempt; an adenocarcinoma of the colon has been reported in a nine-month-old girl **[39].** As regard age the current study showed that the age of male group was 54±1.93 while age of female group was 49.30±1.11 with a total average age was 51.96±1.02 **(Table 4).** This is parallel with **[39]** who studied "Colorectal cancer in Egypt is commoner in young people: Is this cause for alarm?". They reported that the mean age of patients was 51 years with 25% of cancers occurring in patients aged less than 40 years. They stated that the data are similar to those reported in other Middle-Eastern countries and are much higher than in Western countries. Also as regard weight the present results clarified that the female group weight was 86.53±2.44 before nutritional educational intervention and it had been reduced into 76.07±2.01 after nutritional educational intervention. While the male group weight was 72.11±1.65 before nutritional educational intervention and it had been reduced with total weight loss 13.61±1.83; more than half of the studied group their weight change duration was six months **(Table 4).** This was similar to **[14]** who studied "Pharmacological management of anorexia and cachexia". Also consistent with **[49]** who studied; "Intervention of unintentional weight loss in patients with cancer". They stated that studies report positive but short-lived effects on clinical outcomes such as appetite and quality of life, with minimal or no effect on weight gain. Risk of adverse effects as muscle wasting and immunosuppression are limiting the use for long-term use for appetite stimulation. This may be because diet alone cannot prevent someone from getting colorectal cancer, avoiding certain risk factors such as smoking, excessive alcohol consumption, being overweight, and lack of regular physical activity can contribute to a person's lower colorectal cancer risk.

Answer Hypothesis No. 2:

Patients who will receive the nutritional educational intervention are more likely to have better dietary habits than before the nutritional educational intervention.

The present study results revealed that almost two thirds of the studied group did not skip any meals before nutritional educational intervention and had been reduced to only one third after nutritional educational intervention with p value 0.00048. Also as regard the appetite; the present study results show that appetite has been reduced at the beginning of the course of treatment and improved by completion of the treatment with p value 0.043. Additionally, the majority of them were drinking coffee and caffeine beverages before nutritional educational intervention but it had been reduced after nutritional educational intervention with p value 0.037. Although more than two thirds of the study group were exercising before nutritional educational intervention, their percentage had been reduced after nutritional educational intervention with p value 0.038 **(Table 5, 6, 7 and Figure 1,2& 3).** It is contradicted with **[50]** who studied "Risk of Colon Cancer and Coffee, Tea, and Sugar-Sweetened Soft Drink Intake: Pooled Analysis of Prospective Cohort Studies". They reported that Coffee and tea are among the most commonly consumed beverages worldwide, and they have been hypothesized to decrease the risk of colon cancer, polyphenols present in coffee and tea protect against colon tumor formation in animal studies, possibly through their antioxidant properties **[51].** In addition, coffee consumption may reduce the synthesis and secretion of bile acids, potential promoters of colon carcinogenesis and increase colonic motility, thus decreasing exposure of epithelial cells to potential carcinogens in the colon **[52].** This could be due to anticancer treatments (chemotherapy and radiation therapy) can cause anorexia, early satiety, nausea, vomiting, oral and intestinal mucositis with dysphagia, diarrhea, hemorrhoids, anal fissures, and modifications in smell and taste senses. All these symptoms may affect food choices and contribute to inadequate meal intake and reduced quality of life. Around the world, tea is the most common drink after water.

Answer Hypothesis No. 3:

Patients who will receive the nutritional educational intervention are more likely to have better biochemical analysis than before the nutritional educational intervention.

The current study results revealed that there is a statistical significance difference in CEA before and after treatment in male and female groups with T 2.68 & 2.29 respectively with p value <0.05 **(Table 8).** It is similar to **[53]** which studied "Carcinoembryonic Antigen (CEA)". It has been reported that CEA is present in the gastrointestinal tract during fetal life and occurs at low concentrations in adults. CEA was first reported to be quite specific for tumours of the GI tract, but further investigations demonstrated elevations in several other malignant and benign diseases. Elevated CEA levels are suggestive, but not diagnostic of cancer, since elevated levels also occur in a variety of benign conditions. Also most normal persons have detectable concentrations of circulating CEA. Approximately 85% of adults had CEA levels less than 2.5 ng/mL. While 95% had levels less than 5.0 ng/mL. Additionally, the CEA shows in the present study that it was higher in male 4.8±0.01 & 5.81±0.04 than female 2.92±0.11&3.22±0.21 before and after treatment respectively. This is confirmed with **[53].** It is evidenced that CEA levels are slightly higher in men than women. The median level is 3.4 ng/mL in men and 2.5 ug/mL in women. Healthy persons seldom have levels above 10 ng/mL.

Also the present results revealed that there is a reduction in platelet count after intervention rather than before intervention with a highly statistical significance difference in male and female groups with T 2.37 & 4.15 respectively with p value <0.001 **(Table 8).** It is parallel with **[54]** who studied "Platelet indices in patients with colorectal cancer". They reported that thrombocytosis is observed in patients with cancer including colorectal cancer and elevated platelet count is associated with poor survival. Platelets are also considered to play a role in metastasis. As reported by **[55]** who investigated mean platelet volume (MPV) values in the diagnosis of bone marrow metastasis in patients with solid tumors and they found that the mean MPV in patients with marrow metastasis is lower than in patients without metastasis., it was found that thrombocytosis is a prognostic factor in stage II colon cancer **[56].**

Also the current study emphasized that the RBCs had been reduced with male group after intervention rather than before intervention with no statistical significance while there is significant statistical difference with female between before and after intervention (Table 8). This is in line with [57] who studied "What Are the Symptoms of Colon Cancer? Identify Local and Systemic Symptoms". She stated that systemic colon cancer symptoms are those that affect the whole body such as weight loss, loss of appetite, unexplained fatigue (extreme tiredness), Nausea or vomiting, Anemia (low red blood cell) count and Jaundice (yellow color of the skin and whites of the eyes) . This may due to the effect of colorectal type of treatment such as (chemotherapy –surgery-radiotherapy).

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Answer Hypothesis No. 4:

Patients who will receive the nutritional educational intervention are more likely to have better weight change than before the nutritional educational intervention.

The present study results showed that weight loss was variated between male 13.61±1.83 and female 15.05±1.75 with total 14.24±1.06 **(Table 4).** It is confirmed with **[58]** who studied "Unintended Weight Loss Needs to Be Evaluated by Doctor ". She reported that possible causes of unintentional weight loss include depression, frequent diarrhea, hyperthyroidism (an overactive thyroid gland), infection, poor nutrition, AIDS, and cancer. Tumors are their own life form. They require a blood supply and energy to grow, and they also release their own waste products. Since they're living inside the body, tumors use the blood and nutrients and release their waste products inside the body. It is unlikely to notice that the diversion of blood and nutrients, but sometimes tumors release chemicals that increase the body's metabolism (such as burn calories faster), which can lead to unexplained weight loss. The idea of a tumor as its own life form may also partially explain why many people with cancer do not want to eat, so an unusual loss of appetite is another sign to look out for. Aside from the fatigue and nausea of cancer treatments like chemotherapy, eating may feel like a person is "feeding the tumor." This is may be due to side effects following the type of treatment for colorectal cancer as chemotherapy; the patient experienced significant and unintentional weight loss as a result of stomatitis, nausea, and vomiting and malnourished with poor ingestion. Afterward, through nutritional interventions via the nutrition care process, the patient's quantity of food intake will be increased and further increases will be expected under continuous care.

Many deaths from colorectal cancer as well as other cancers can be prevented with early detection and treatment. Eating a healthy diet, avoiding obesity, exercising regularly, and lowering the amount of alcohol and cigarette use can all help decrease colorectal cancer. Nurses should consistently review the literature related to colorectal risk factors in order to better advise their patients regarding useful lifestyle modifications that may minimize an individual's risk of developing colorectal cancer **[45].** This was proofed by the results of the current study; as regard dietary habits e.g. using of vitamins / minerals it was 80.0% of the studied group did not use vitamins while had been improved into 86.7% with T and p value 0.78. In addition, body mass index was found 28.01±0.25 before intervention and had been reduced into 26.16±0.16 after intervention. As regard weight it was 78.36±1.12 before nutritional educational intervention and had been improved into 72.37±1.66 for the total study subjects after nutritional educational intervention. Also as regard biochemical values of WBCS it was found that 7.61±0.03 before nutritional educational intervention and had been improved into 9.15±0.39 after nutritional educational intervention.

5. CONCLUSIONS

A significant result was proofed by better dietary habits, changing of body weight and an increased WBCS after the nutritional educational intervention than before intervention. A colon cancer was the major diagnosis and Surgery followed by chemotherapy was the largest method of treatment among the studied sample. There is an improvement in body mass index after the nutritional educational intervention, in addition, there was a significant difference as regards appetite, meal skipping, drinking caffeine and performing physical exercise before and after the intervention. While there was no significant difference as regards having snacks or taking vitamins before and after the intervention.

6. RECOMMENDATION

- Developing strict written guidelines with colored pictures about prohibited, allowed nutrition and self-care for colorectal cancer patients.
- Planned monitoring of the patient after discharge is an integral component to the success of the rehabilitation approach and the ability of patient & family to move toward self-management of this chronic disease.
- Further study is required to be undertaken finding out whether colorectal cancer affecting young population is due to regional factors or whether it is indicative for a changing pattern of colorectal cancer. occurrence.

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