

# Nutritional status and diet of preoperative and 7 days postoperative patients with colorectal cancer at National Cancer Hospital 2018-2019.

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## Abstract

A cross-sectional study was conducted with the participation of 100 patients engaging colorectal cancer at National cancer hospital in two consecutive years 2018-2019 in an attempt to assess the nutritional status of preoperative and postoperative colorectal cancer patients and their dietary intake during the period of 7 days after the operation. The results showed that, prior to the surgery, the percentages of hospitalized patients who were inclined to contract malnutrition were 55% and 36% based on SGA tool and Albumin index, respectively. The proportions of patients suffering weight loss within 6 months and 1 month were 80% and 79% accordingly, in which 11% patients shed more than 10% body weight. Additionally, the research also demonstrated that 7 days after operation: The proportion of malnutrition patients moderately climbed by 8%, meanwhile a modest decrease of 3% was seen in the overweight rate among those patients. Besides, 92% patients experienced weight loss with the estimated average of  $1.86 \pm 1.09$  kg.

In the postoperative period, meticulously, the patients were given parenteral nutrition for the duration of 6.3 days on average. The time to embark on oral nutrition was  $3.3 \pm 2.4$  days. The ratio of patients satisfying the suggested energy volume was disappointingly low. The majority of diets provided for surgical patients were deficient in terms of mineral and vitamins.

**Keywords:** Nutritional status, Nourishment, Colorectal cancer, National cancer hospital.

*Accepted on July 9, 2020*

## Introduction

Cancer-one of the leading causes of death worldwide is showing an upward tendency and becoming an onerous burden for the whole society [1]. According to GLOBOCAN, the year 2018 witnessed 18.1 million new cases and 9.6 million fatalities from cancer, of which colorectal cancer (CRC) ranked the third in new incidence (10.2%) as well as in mortality (9.2%). In Vietnam, CRC was the fourth in men (8.4%) and the second in women (9.6%) [2]. Colorectal cancer is a cancer that starts in the colon or the rectum. These cancers can also be named colon cancer or rectal cancer, depending on where they start. But, they are often grouped together because they have many features in common.

Malnutrition is considered as a prognostic factor which not only reduces the quality of life but also affects the treatment results of cancer patients in general and CRC in particular. In accordance with Monika Zietarska, in 2017, 73.3% of CRC patients were at risk of malnutrition, of which 2.7% was at high risk of malnutrition [3]. Research by Burden ST et al. (2010) on subjects with CRC demonstrated that after surgery, 77% of patients lost weight, in which 20% of patients lost more than 10% of their body weight within 2 months [4]. People with malnutrition were 5-52% higher risk of death and infection, increased postoperative complications, reduced ability to respond to treatment, raised hospital fees due to prolonged hospital stay [5].

According to Garth AK's research in gastrointestinal cancer patients (2010), the average length of hospital stay was 12 days, the percentage of complications was 35%. In terms of the patient group who lost more than 10% of the weight, the number of days in hospital was 17 days, patients with malnutrition had twice as many hospital days as patients with good nutrition (15.8 days and 7.6 days) with  $p < 0.05$  [6]. Hitherto, in Vietnam, there have not been many studies describing the nutritional status of patients with CRC, and the patient care after surgeries has not been much concerned, so the principal purposes of us conducting this research are: describing the nutritional status of pre-operative and postoperative CRC patients as well as the dietary intake during 7 days after surgery.

## Subjects and Method

### Subjects

Over 18 year old patients, who were diagnosed with colon cancer (CC) or rectal cancer (RC) by the results of anatomy, were prepared for hospitalizing for surgery, were capable of listening comprehension, had completed medical records and agreed to participate in the research.

### Method

Research design: a cross-sectional study

## Sample size and sampling

Sample size: Based on the formula for calculating the sample size for estimating a ratio in the population.

$$n = Z_{1-\alpha/2}^2 \frac{p(1-p)}{d^2}$$

In particular:

n=Total objects to be investigated

$\alpha$ =The level of statistical significance (choose  $\alpha=0.05$ )

d=0.1 is the desired deviation between the sample and the research population.

p=The malnutrition rate of patients taken from a previous study (p=0.394 [7])

An additional 10% providing for the patient's withdrawal and incorrect information.

Hence the minimum sample size is **100 objects**.

Sampling: For convenient sampling, all eligible patients during the period from July, 2018 to March, 2019 in the Abdominal Surgery Department 1 and Abdominal Surgery Department 2 of National cancer hospital were selected to participate in the study.

## Research contents

General characteristics: Full name of patient, age, gender, ethnicity, address, occupation, education level.

Nutritional status: Height, weight, weight in 1 month before surgery, weight in 6 months before surgery, percentage of body fat, BMI, SGA, Albumin.

Feeding regime: Feeding tract, nutrient composition in infusion liquid and in ration for 7 days after surgery.

**Table 1:** Nutritional status of patient according to type of cancer.

Variables	CC n(%)	RC n(%)	Combined n(%)	P
BMI	BMI<18.5	16 (24.6)	8 (22.9)	p>0.05*
	18.5 ≤ BMI<25	43 (66.2)	22 (62.9)	
	BMI ≥ 25	6 (9.2)	5 (14.3)	
SGA	SGA-A	29 (44.6)	16 (45.7)	p>0.05*
	SGA-B	35 (53.8)	18 (51.4)	
	SGA-C	1 (1.6)	1 (2.9)	
Albumin	<35 g/l	16 (28.1)	15 (51.7)	p<0.05**
	≥ 35 g/l	41 (71.9)	14 (48.3)	

**Note:** \*Fisher- exact test, \*\*X2 test

According to the methods of assessing nutritional status such as BMI, SGA and Albumin, before surgery, the rate of malnutrition between CC group and RC group was different. However, only the difference in Albumin index between CC

## Data collection

Information collection techniques: Direct interviewing according to questionnaires, combining with observation, measurement anthropometric indicators, 24-hour ration questioning method, some information about subclinical results which was taken from medical records.

Data collection tools: Built-in questionnaires, Tanita scales, wooden rulers for height measurement, photo book used in the investigation of diets of the National Institute of Nutrition.

Data processing and analysis: After being cleaned, collected data will be imported into the computer with epidata 3.1 software and be analyzed with TATA 12.0 software. The diet will be analyzed by utilizing Table of nutrient composition of the National Institute of Nutrition (NIN).

## Results

### Nutritional status of CRC patients before and after surgery

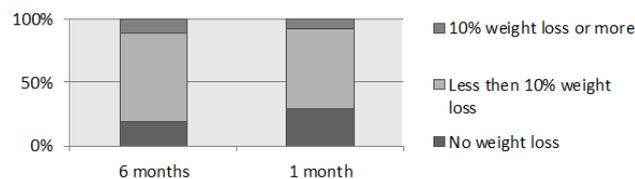
The study was conducted on 100 patients with the ratio between men and women respectively 58% and 42%. The average age of the subject was  $58.6 \pm 1.07$  years old. The majority of patients participating in the study were farmers (42%). The proportion of RC patients was 35.7% and occupied the highest rank. In the group of CC patients, the number of patients with colon cancer accounted for the highest proportion (19.4%) followed by sigmoid colon cancer (18.4%), transverse colon cancer (10.2%), left-sided colon cancer (6.1%) while hepatic flexure colon cancer and splenic flexure colon cancer registered the lowest rate of 5.1% (Table 1).

group and RC group (51.7% and 28.1%, respectively) was statistically significant with  $p<0.05$ .

In the last 6 months, the weight loss situation in CRC patients was high (80%). In particular, the situation of <10% weight loss accounted for 69% and significant weight loss ( $\geq 10\%$

weight loss) accounted for 11%. The weight loss rate in the last 1 month is 70%, in which 7% of patients have decreased by  $\geq 10\%$  of body weight and 63% of patients have reduced their body weight by 10% (Figure 1).

All three indicators (weight, percentage of body fat and BMI) before surgery were reduced after 7 days of surgery. However, only the difference in the mean weight index was statistically significant with an average reduction of 1.8 kg after 7 days of surgery with  $p < 0.05$  (Table 2).



**Figure 1:** Weight loss status of patient 1 month and 6 months before surgery.

**Table 2:** Nutritional status of study subjects before and after surgery.

Indicators	Before Surgery		7 days after Surgery		p
	(X ± SD)	Min-Max	(X ± SD)	Min - Max	
Weight (kg)	52.3 ± 9.1	31.8-82	50.5 ± 8.8	30.2-79.5	p<0.05*
Percentage of body fat (%)	22.1 ± 7.8	5.2-41.2	22.0 ± 7.4	5.7-46.2	p>0.05*
BMI (kg/m <sup>2</sup> )	20.9 ± 3.0	14.3-29.3	20.2 ± 3.0	12.7-27.8	p>0.05*

Note: \*t test

### The nutrition for patients during the 7-day period after surgery

Within 7 days after surgery, the first 2 days the patient was completely nourished through parenteral nutrition support, this rate gradually decreased and was combined with enteral nutrition support in the following days. The average time in which patients were fed through parenteral nutrition support (alone or in combination) was 6.3 days. The average time to start the enteral nutrition support in the study subjects was 3.3 days. There were 41% of patients who received enteral nutrition support began on day 3 after surgery. The number of patients who have not yet started eating on the 7th day after surgery was 13, accounting for 13% (Table 3).

The proportion of nourished patients who achieved recommended level of nutrition from different organizations varies but very low. The rate of meeting the demand for recommendations for energy and protein of the European Society for Clinical Nutrition and Metabolism (ESPEN) was higher than the rate that meets the recommendations of the National Institute of Nutrition (NIN) [8,9]. During 7 days after surgery, the response rate of recommended demand by ESPEN and NIN was relatively stable (1.6%) but hit the lowest point on the 3rd and 4th days after surgery (Table 4).

After surgery, most feeding regimes do not meet the needs of vitamins and minerals [9]. None of the study subjects were

provided with sufficient recommendations for EPA, arginine, and selenium. The percentage of patient's diet which provided enough vitamin B6, vitamin B12, folic acid, vitamin C, iron, zinc was very low. This rate experienced a gradual rise in the following days when the patient was switched to enteral nutrition support. By the 7th day, this ratio was respectively 23%, 26%, 25%, 13%, 17% and 15%. In the first 2 days after surgery, most patients are not provided with essential vitamins and minerals in infusion fluids (Table 5).

**Table 3:** The nutrition for patients during the 7-day period after surgery.

Days	Parenteral nutrition support		Parenteral and enteral nutrition support		Enteral nutrition support	
	n	%	n	%	n	%
Day 1	100	100	0	0	0	0
Day 2	100	100	0	0	0	0
Day 3	57	57	41	41	2	2
Day 4	37	37	61	61	2	2
Day 5	21	21	72	72	7	7
Day 6	16	16	67	67	17	17
Day 7	13	13	66	66	21	21

**Table 4:** Meeting the demand for recommendations for energy and protein after surgery.

Categories	Energy n(%)		Protein n(%)		
	ESPEN	NIN	ESPEN	NIN	
Day 1	Achieved $\geq 75\%$	31 (31%)	22 (22%)	25 (25%)	33 (33%)
	Achieved $\geq 100\%$	1 (1%)	0 (0%)	1 (1%)	1 (1%)

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Day 2	Achieved $\geq$ 75%	28 (28%)	21 (21%)	21 (21%)	33 (33%)
	Achieved $\geq$ 100%	3 (3%)	1 (1%)	2 (2%)	2 (2%)
Day 3	Achieved $\geq$ 75%	2 (2%)	2 (2%)	3 (3%)	4 (4%)
	Achieved $\geq$ 100%	1 (1%)	1 (1%)	1 (1%)	1 (1%)
Day 4	Achieved $\geq$ 75%	4 (4%)	4 (4%)	4 (4%)	15 (15%)
	Achieved $\geq$ 100%	1 (1%)	1 (1%)	2 (2%)	2 (2%)
Day 5	Achieved $\geq$ 75%	22 (22%)	11 (11%)	23 (23%)	44 (44%)
	Achieved $\geq$ 100%	2 (22%)	2 (2%)	1 (1%)	12 (12%)
Day 6	Achieved $\geq$ 75%	27 (27%)	25 (25%)	18 (18%)	29 (29%)
	Achieved $\geq$ 100%	2 (2%)	1 (1%)	2 (2%)	19 (19%)
Day 7	Achieved $\geq$ 75%	28 (28%)	27 (27%)	27 (27%)	23 (23%)
	Achieved $\geq$ 100%	1 (1%)	1 (1%)	2 (2%)	21 (21%)

**Table 5:** Values of Vitamins and Minerals from feeding regime after surgery

Variables	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Ca:P X (n%)	0(0%)	0(0%)	0.2(3%)	0.2(5%)	0.3(21%)	0.7(42%)	0.9(46%)
Vitamin B12 ( $\mu$ g/day) X (n%)	0(0%)	0(0%)	0.1(13%)	0.2(14%)	0.5(19%)	0.8(24%)	1.1(26%)
Vitamin B6 ( $\mu$ g/day) X (n%)	0(0%)	0(0%)	0.3(7%)	2(13%)	0.9(13%)	1.9(20%)	0.6(23%)
Acid Folic ( $\mu$ g/ngày) X (n%)	0(0%)	0(0%)	1.7(10%)	11.1(14%)	40.9(18%)	72.5(23%)	85.1(25%)
Vitamin C (mg/day) X (n%)	0(0%)	0(0%)	0.4(0%)	0.5(0%)	10.4(3%)	25.5 (8%)	32.4 (13%)
Iron (mg/day) X (n%)	0(0%)	0(0%)	0.2(0%)	0.8(5%)	1.8(11%)	2.7(15%)	3.1(17%)
Zinc (mg/day) X (n%)	0(0%)	0(0%)	0.3(3%)	0.9(6%)	2.1(12%)	3.6(12%)	3.5(15%)

## Discussion

### Nutritional status before and during the 7-day period after the surgery

The study results reveals that the average weight of patients decreased by 1.8 kg after 7 days of surgery. Beattie and her colleagues did research on patients with gastrointestinal surgery and indicated that the patient's weight was reduced by 4.21 kg after surgery [10]. This difference is due to the fact that the follow-up time of the two studies was different. The patients in this study were followed for 1 week-2 weeks shorter than Beattie's study therefore the process of weight loss recognition of patients would be monitored in longer time and the amount of lost weight would be higher.

Assessing nutritional status according to SGA, before surgery, the proportion of patients with malnutrition risk was 55%, of which 2% rated serious malnutrition. In the research of Gupta and colleagues, the nutritional status was also assessed by SGA and showed that the rate of malnutrition similar to this study was 52% [11]. Based on BMI, before surgery, the rate of general malnutrition was 24% and the rate of overweight and obesity was 11%, after surgery, the rate of malnourished patients stood at 32% and there were 8% patients with

overweight and obesity. This result was different from the study in Taiwan which was also on CRC patients in 2012 when the malnutrition rate was 4.4% and the obesity rate was up to 46.6% [12].

This can be explained by the fact that the epidemiological, racial, genetic factors, which affect the anthropometric index in different countries, are different. At the same time, in the research in Taiwan, the value of overweight and obesity is from 24 kg/m<sup>2</sup>, unlike this study's which is 25 kg/m<sup>2</sup>. According to the research of Hu WH and colleagues, which lasted from 2009-2013 on cancer patients, the proportion of patients with low Albumin levels in the blood was 27.3% lower than in this study. This difference may be explained by the fact that Hu WH's survey was conducted among various groups of cancer patients while this study was only carried out on the group of CRC patients [9].

### The regimen of nourishing patients for 7 days after surgery

After surgery, 100% of patients are fully nourished by parenteral nutrition support in the first 2 days. On average, after 3.3 days, patients practice to eat again. Patients in the study have the gastrointestinal tract nourished later than the

recommendation of ESPEN for patients with colorectal cancer, which states that patients should have early nourishment of the gastrointestinal tract within the first 24 hours and switch to soft food within 48 hours after surgery to help restore intestinal villi, reduce bacterial gonorrhoea, reduce variables postoperative evidence and shorten hospital stay [13]. However, patients in this study received enteral nutrition support earlier compared to Chu Thi Tuyet intervention study on the control group with an average value of 109.5 hours (4.56 days). At the same time, the study also indicates that early nursing for an average patient at 37.7 hours is safe and helps cut down the length of hospital stay for patients with gastrointestinal surgery [14].

The ratio of patients satisfying the suggested energy volume was disappointingly low. In terms of total energy supplied from the seven-day diet after surgery, average energy only achieves 50%-60% of ESPEN's recommended demand generally. Especially energy of 3rd and 4th day after surgery is lowest, only 433 and 533 kcal/day, respectively. In the first 2 days, the maximum energy supply was 750 kcal/day and 730 kcal/day. This change is due to the fact that when patients start to practice oral feeding, doctors begin to gradually reduce or stop nourishing with infusions while the oral nourishment of patients has not met the recommended needs. In particular, most patients are undergone a training period to eat salt watery porridge on 3rd and 4th day, thus, the total energy from the intravenous and the oral route is low, leading to a far difference compared to the special recommended needs on these 2 days.

The study conducted by Nguyen Thi Thanh at the Medical University Hospital and Bach Mai Hospital in 2017 had much higher results than we did when the energy supply on the first day and the second day reached 1010.6 kcal and 1017.4 kcal while the ration values also showed relatively similar results of this study, at about 638.1 kcal/day in the following days. This difference may be due to the fact that in the first 2 days after surgery, the patients are mainly nourished completely by intravenous route and the characteristics of the doctors' infusion between different hospitals [7]. As shown in the study of Geirsdottir (2008) and Surwillo (2013) on the group of cancer patients, the energy that patients were provided was higher than this one, respectively  $1905 \pm 500$  kcal/day and  $1608 \pm 436$  kcal/day [15-18]. Inadequate feeding in postoperative patients is associated with poor outcomes that increase complication rates, hospital stay, mortality in patients with upper gastrointestinal cancer and CRC. Therefore, balancing parenteral with enteral nutrition support is essential when taking care of postoperative patients with CRC.

The diet of patients 7 days after surgery is still not diversified, the first days' diets are mainly salt watery congee. Later on, they are gradually shifted to soft diets with restricted quantity. Meanwhile, vitamins and minerals are rarely added in patients' infusions as well as no oral substitutes. This results in a great shortage of vitamins and minerals in the diet while these substances play a paramount role in the healing process and recovery of patients [8]. Especially, the patients in the study were also not provided with all necessary amino acids such as Arginine or DHA, EPA, selenium, which is of significant importance in preventing and limiting cancer cachexia.

The research was conducted objectively by suitable technical to ensure providing honest information about the nutritional status of the subject. However, there are still many limitations. Firstly, although the sample size is calculated according to the available formula but it is still small so not representative for all patients. The secondly, data is fragmented, which make it difficult to analyze the data. Finally, some biochemical index observed in the study (Albumin) has not been fully listed in the medical record.

## Conclusion

The malnutrition rate of CRC patients is quite high, along with the situation of weight loss after surgery, the fact that the diet has not met the demand affects the treatment results. Therefore, it is necessary to have appropriate nutritional interventions especially postoperative feeding regime to improve nutritional status, weight loss of patients with CRC surgery.

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