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Profile of Nutritional Status Based on Chemotherapy Regimen and Cycle in Colorectal Cancer Patients at Dr. Mohammad Hoesin Hospital Palembang

Fadhil Muhammad[1], Efman E.U. Manawan[2], Ardesy Melizah Kurniati[3]*, Muhammad Hafidh Komar[2], Evi Lusiana[4], Syarinta Adenina[4]

[1]Medical Education Program, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia
[2]Department of Surgery, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia
[3]Department of Nutrition, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia
[4]Department of Pharmacology, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia
E-mail: ardesy.gizi@fk.unsri.ac.id

Abstract

A cancerous growth that develops from the colon's or rectum's epithelial tissue is called colorectal cancer. Chemotherapy is one of the interdisciplinary approaches used to treat colorectal cancer. Chemotherapy is administered in cycles of one to eight. One of the many adverse consequences of chemotherapy is a decline in nutritional status. In this study, colon cancer patients receiving chemotherapy at Dr. Mohammad Hoesin Hospital Palembang will have their nutritional status described using BMI. It was a descriptive investigation. The most recent medical records of colorectal cancer patients who visited Dr. Mohammad Hoesin Hospital Palembang for chemotherapy were used to gather data. Of the 44 patients, the majority were equally male and female (50%), middle-aged (52.3%), had colon cancer (50%), were in stage IV (75%), had undergone chemotherapy cycle 2 (34.1%), were on the FOLFOX 6 regimen (27.3%), and were well-nourished (50%). The majority of the study's patients were normoweight individuals, undergoing chemotherapy cycle 2, and were on the FOLFOX 6 regimen.

Keywords: Colorectal Cancer, Chemotherapy, Nutritional Status

1. Introduction

A malignant tumor that starts in the colon's or rectum's epithelial tissue is called colorectal cancer (CRC). It is the third most commonly diagnosed cancer globally and the second leading cause of cancer-related deaths. Men have a greater incidence rate of colorectal cancer. with an incidence rate of 20.6 per 100,000 individuals compared to 14.3 per 100,000 individuals in women. The majority of patients are aged over 50 years, with 75% of rectal cancer patients and 80% of colon cancer patients. According to GLOBOCAN data (2020), the incidence of CRC in Indonesia ranks fourth, with a total of 34,189 cases.[1–3]

The management of CRC is multidisciplinary. Treatment and recommendations depend on several factors. In early-stage cancer, surgical therapy is the primary modality with a curative intent. For advanced-stage cancer, chemotherapy can be performed with a palliative intent. Chemotherapy in CRC can also be administered as adjuvant and neoadjuvant therapy. Stage III and high-risk Stage II CRC are recommended for adjuvant chemotherapy. Currently, the standard chemotherapy regimen for both adjuvant and palliative treatment of CRC is FOLFOX 6 or its modification (mFOLFOX6). The frequency of chemotherapy usually consists of one to eight cycles depending on the cancer stage, treatment goals, types of drugs used, and the patient's response.[4,5]

One of the chemotherapy side effects is the deterioration of the nutritional status of patients, primarily due to inadequate intake of protein and calories. Malnutrition incidence in cancer patients is estimated to be between 40-

80%. Chemotherapy has several side effects, including nausea, vomiting, and diarrhea. Insufficient nutritional intake can lead to fatigue, weakness, and increased vulnerability to infections. Conversely, adequate nutrition can accelerate wound healing, enhance the immune response to infections, normalize bowel activity, and maintain the function of vital organs.[6–9]

Nutritional status describes the condition resulting from the balance between nutrient intake and nutritional requirements. Nutritional status in cancer patients is influenced by internal factors (age, physical activity, infections, cancer type, therapy side effects) and external factors (knowledge, occupation, income, and culture). The method used to assess nutritional status is through anthropometric measures. Body Mass Index (BMI) is one of the anthropometric parameters used to assess nutritional status. Compared to other methods of assessing nutritional status, BMI measurement is easier, doesn't require specialized personnel, the equipment used is easily accessible and durable, and the measurements align with established standards.[5,10]

The research on the nutritional status of colorectal cancer patients undergoing chemotherapy has not yet been conducted in Palembang City. In a study by Made et al (2018) using the BMI parameter at Sanglah Hospital Denpasar, it was found a significantly strong negative correlation between chemotherapy frequency and nutritional status, indicating that a higher frequency of chemotherapy leads to lower nutritional status in patients. However, in another study, there was no observed relationship between chemotherapy and nutritional status. 5, 11, 12 Therefore this study is conducted to understand the nutritional status of colorectal cancer patients undergoing chemotherapy at Dr. Mohammad Hoesin Hospital in Palembang.

2. Method

This study design was descriptive research. The sample used comprises patients diagnosed with colorectal cancer undergoing chemotherapy and those recorded in the medical records of Dr. Mohammad Hoesin Hospital in Palembang. Data was taken from the latest medical records of patients who came for chemotherapy at Ruang Rambang. We took medical record data there because we wanted to find the latest BMI examination results and the condition of the therapy they were undergoing at that time. The sampling technique used in this study was consecutive sampling. The minimum sample size in this study was 43 patients. Patients undergoing chemotherapy with complete and physically intact body members were included in this study. Exclusion criteria for this study are patients with incomplete medical record data.

The research variables included in this study were the frequency of chemotherapy, chemotherapy regimen, BMI, gender, age, cancer location, and cancer stage. We used the WHO-Asia Pacific standard for BMI because it was deemed suitable for relating it to disease in our population (<18.5 kg/m^2: underweight, 18.5–22,9 kg/m^2: normal, 23–24.9 kg/m^2: overweight, >25kg/m^2: obese).[11]

The data collected from medical records were categorized based on the research variables. Subsequently, they were processed and grouped according to the research objectives. The data were analyzed using the Statistical Package for Social Science (SPSS 25) and presented in tabular form, accompanied by a narrative explanation. This research has been deemed ethically acceptable by the research ethics committee of the Faculty of Medicine, Sriwijaya University (No. 295-2022).

3. Result

The study population consisted of 65 research subjects receiving treatment for colorectal cancer with chemotherapy in December 2022. Among the 65 subjects, 21 were excluded due to incomplete medical record data. According to the research data, there were 22 male patients (50%) and 22 female patients (50%). The age distribution of colorectal cancer patients undergoing chemotherapy at Dr. Mohammad Hoesin Hospital revealed that out of a total of 44 patients, most were in the age range of 41–60 years. Based on the diagnosis in the medical record, most of the cancer's location was in the colon (Table 1).

Table 1. Characteristics of Research Subjects

Characteristics	n	Percentage
Sex		
Male	22	50
Female	22	50
Age		
18-40 yo	9	20,5
41-60 yo	23	52,3
>60 yo	12	27,3
Location		
Colon	22	50
Rectum	19	43,2
Colorectal	3	6,8

Table 2. Distribution and Frequency of Colorectal Cancer Patients Undergoing Chemotherapy Based On Cancer Stage, Frequency, And Regimen

	n	Percentage
Stadium		
Stadium I	1	2,3
Stadium II	8	18,2
Stadium III	2	4,5
Stadium IV	33	75
Frequency		
Cycle 1	8	18,2
Cycle 2	15	34,1
Cycle 3	6	13,6
Cycle 4	6	13,6
Cycle 5	4	9,1
Cycle 6	4	9,1
Cycle 7	1	2,3
Regimen		
FOLFOX 4	8	18,2
FOLFOX 6	12	27,3
FOLFIRI	11	25,0
XELOX	10	22,7
FUFA	3	6,8
Total	**44**	**100**

Table 3: Nutritional Status Distribution Among Chemotherapy-Treated Individuals With Colorectal Cancer

Nutritional Status	n	Percentage
Underweight	11	25,0
Normal	22	50,0
Overweight	6	13,6
Obesity	5	11,4
Total	44	100

Upon further search, 28 medical records were obtained that included specific locations based on the results of anatomical pathology examinations. The cancer locations were reported as follows: rectum with 14 patients (50%), transverse colon with 3 patients (10.7%), ascending colon with 1 patient (3.6%), sigmoid colon with 5 patients (17.9%), and rectosigmoid with 5 patients (17.9%).

Most patients are diagnosed as stage IV cancer, and a large number of patients are on cycle 2 chemotherapy. The cancer stadium, frequency and regimen of chemotherapy can be seen in Table 2. This research has revealed that, out of a total of 44 patients, the majority had a normal nutritional status (50%). Meanwhile, patients with underweight and overweight/obese had the same percentage, which was 25% (Table 3)

4. Discussion

This study found that there are same proportion for male and female groups. This result is not in line with previous study conducted by several cancer control centers which revealed that colorectal cancer patients were found more in males as much as 58.9% than females as much as 41.1%. Research at Murni Teguh Memorial Hospital indicates that gastrointestinal cancer is more common in men than women, 58.3% in males and 41,7% in women. The higher incidence of colorectal cancer in the male group is due to the dietary patterns and lifestyle more commonly observed in males compared to women, such as smoking and alcohol consumption, a low-fiber diet, and red meat consumption habits.[2,3,12,13]

The majority of patients with colon cancer receiving chemotherapy at Dr. Mohammad Hoesin Hospital were middle-aged (41–60 years). This outcome is consistent with previous research at Sanglah Hospital Denpasar which showed the majority of cancer patients were middle-aged adults (41–60 years). Similarly, research at PKU Muhammadiyah Surakarta Hospital states that the majority of cancer patients are at the age of 46–55 years by 45%. Age over 50 years can increase the risk of colorectal cancer.[5,14–16]

The cancer location was predominantly in the colon at 50%, whereas in anatomical pathology examinations, the rectum dominates at 50%. These findings align with studies conducted by various cancer control centers, which depict 68.9% of colorectal cancers being located in the colon. However, these results contradict research at Dr. Soedarso Pontianak Hospital, which is dominated by rectum (55,9%). This situation corresponds to the location of ulcerative colitis polyps, where nearly 95% of these polyps are in the rectal area. Ulcerative colitis is a contributing factor to colorectal cancer, with almost 95% of its polyps located in the rectum.[1,17,18]

The stage of cancer in this study was mostly in cancer stage IV. Research conducted at various cancer control centers illustrates that 73.6% of colorectal cancer patients are in Stage IV. This is because the early stages of colorectal cancer often being asymptomatic. Chemotherapy frequency ranges from cycle 1 to cycle 7, with cycle 2 dominating at 34.1%. The

study's findings are consistent with research from Sanglah Hospital in Denpasar that found up to 65% of cancer patients had received chemotherapy for one to three cycles. Chemotherapy cycles typically range from one to eight cycles. The administration of chemotherapy is periodic, with patients receiving treatment every two, three, or four cycles interspersed with recovery periods before resuming the treatment phase, according to the chemotherapy regimen provided.[2,4,5,17,19]

Based on the findings of this research, the most frequently used chemotherapy regimen is FOLFOX 6, followed by FOLFIRI and XELOX. These findings align with research conducted at Dr. Moewardi Regional Hospital, which extensively uses the FOLFOX regimen. Chemotherapy uses medications to destroy cancer cells. These drugs enter the bloodstream and circulate throughout the body via intravenous injection, injection, pills, or liquids, thus benefiting cancer that has spread to distant organs. FOLFOX 6 is a standard chemotherapy regimen for colorectal cancer, comprising leucovorin (folinic acid), fluorouracil, and oxaliplatin. Chemotherapy medications have the potential to destroy cancer cells, but they may also damage some healthy cells, leading to adverse effects.[4,5,20,21]

This study found a majority exhibit normal nutritional status. These results are in line with studies at PKU Muhammadiyah Hospital in Surakarta, which depict 83.3% of cancer patients having normal nutritional status. Similarly, research conducted at Arifin Achmad Hospital in Pekanbaru regarding the BMI profile of chemotherapy-receiving cancer patients shows a dominance of normal nutritional status or BMI, albeit at a smaller percentage of 49%. These outcomes also correspond with research at Sanglah Hospital in Denpasar, where 73.8% of cancer patients exhibit ideal nutritional status or BMI. Cancer-related malnutrition is characterized by uncontrolled catabolic drive, defects uncorrected by nutritional support alone, considered a primary reason for limited response to nutritional therapy. Weight loss can also be induced by chemotherapy due to nonspecific effects like loss of appetite, and cancer therapy directly impacts muscle and adipocyte cells. When muscle cells are exposed to cytotoxic drugs (such as doxorubicin, cisplatin, oxaliplatin, 5-fluorouracil, and irinotecan), they limit protein synthesis, cause atrophy, oxidative damage, energy depletion, and necrotic cell death or apoptosis.[5,16,19,22]

This research still has limitations. First, this study only displays descriptive data without looking at the relationship between variables. The nutritional status parameters used are only the body mass index available on the medical record. Another indicator that can be used is calf circumference to find sarcopenia, but it is not possible because it was not a routine examination at that time. We were unable to retrieve data on food intake which is an important component that affects nutritional status due to secondary data retrieval.

5. Conclusion

According to this study, middle-aged adults made up the bulk of patients receiving chemotherapy for colorectal cancer. The most common location of cancer was in the colon, and most patients were in Stage IV. The majority received FOLFOX 6 chemotherapy regimen with the second cycle frequency. Most of patient has a normal nutritional status. Further research is needed to understand changes in patients' nutritional status before and after undergoing chemotherapy.

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