nutrición clínica y Dietética Hospitalaria

Artículo Original

Nutr Clín Diet Hosp. 2023; 43(1):81-89
DOI: 10.12873/431taslim

Nutritional status, prognostic nutritional index, and preoperative nutritional support as prognostic factors in clinical outcome of gastrointestinal cancer patients

Nurpudji A TASLIM[1], Margaretha DIANASANTI[2], Grace M TOMBILAYUK[2], Suryani AS'AD[1], Agussalim BUKHARI[1], Haerani A RASYID[1], A Yasmin SYAUKI[1], PRIHANTONO[3]

1 Department of Nutrition, Hasanuddin University School of Medicine, Makassar, Indonesia.
2 Clinical Nutrition Specialist Program, Department of Nutrition, Hasanuddin University School of Medicine, Makassar, Indonesia.
3 Department of Surgery, Hasanuddin University School of Medicine, Makassar, Indonesia.

Recibido: 12/enero/2023. Aceptado: 21/febrero/2023.

ABSTRACT

Introduction: Cancer patients are at risk for malnutrition. Nutrition screening using Subjective Global Assessment and Prognostic Nutritional Index (PNI) was associated with postoperative outcomes. Preoperative nutrition support should be given before patient undergo elective surgery. This study aims to find the relationship between nutritional status, PNI, duration of preoperative nutritional support to clinical outcome of gastrointestinal cancer patients, which are postoperative complications and length of stay.

Methods: This is a cross-sectional study of 72 eligible subjects of 132 participants with gastrointestinal cancer who underwent surgery and met the research criteria, using medical records data. Moderate malnutrition was observed to be higher with preoperative PNI values less than 35.

Result: There was no significant relationship between nutritional status, PNI, duration of preoperative nutritional support on the incidence of infection and surgical complications and total length of stay of postoperative gastrointestinal cancer patients.

Conclusion: there was no significant correlation between 3 variables with the incidence postoperative complications and total length of hospital stay, but there was a significant relationship between the duration of preoperative nutritional support and the postoperative length of hospital stay in patients with gastrointestinal cancer.

KEYWORDS

malnutrition, complication, length of stay, gastrointestinal cancer.

INTRODUCTION

Gastrointestinal cancer is a form of malignancy that occurs in the digestive tract and its accessory organs. Cancer patients, especially those with gastrointestinal malignancies, are at risk for malnutrition. The prevalence of malnutrition in cancer patients ranges from 20% to 70%, while in the prevalence reaches 80% in patients with gastrointestinal cancer. Malnutrition is the most important risk factor for complications associated with major gastrointestinal surgery. Malnutrition would end up in high infection rates, increased loss of muscle mass, impaired wound healing, longer treatment periods, and increased morbidity and mortality[1,2]. Several case report studies also showed the importance of medical nutrition therapy in many cases other than cancer as multidisciplinary approach treatment[3-5]. Daud, et al (2020) found that poor nutritional status were associated with readmission within 30 days of head and neck cancer in Makassar[6].

Preoperative nutritional screening is very important in patients with gastrointestinal cancer who would undergo surgery, specifically malnourished patients or those who were at risk of malnutrition. The Subjective Global Assessment (SGA) is a standard of nutrition screening and was conducted in assessing patients with gastrointestinal cancer at Wahidin

Correspondencia:
Nurpudji A Taslim
pudji_taslim@yahoo.com

Sudirohusodo Hospital. The usage of the Subjective Global Assessment as a nutrition screening method would undermine the possibility of malnutrition or complications related to nutrition[7,8]. Following nutritional assessment, medical nutrition therapy, such as early enteral nutrition should be given as soon as possible. Bukhari, *et al*, found that high-protein polymeric formula administration gave clinical benefit in non-traumatic brain injury critical ill patients[9].

A few biomarkers have been reported as prognostic factors for gastrointestinal cancer. It is important to find effective and inexpensive prognostic markers for patients with gastrointestinal malignancy. Prognostic Nutritional Index is measured from serum albumin concentrations and total lymphocyte count. The Prognostic Nutritional Index revealed the nutritional and immunological status of patients and was used to predict the risk of certain types of complications after surgery. The Prognostic Nutritional Index has been reported to correlate with the prognosis of patients undergoing cancer surgery and has been used as a predictor of short and long-term outcomes after surgery in patients with cancer[10,11].

European Society for Clinical Nutrition and Metabolism (ESPEN) Guidelines on surgery in 2017 recommended preoperative nutrition assessment in patients with malnutrition and those at risk of malnutrition. Preoperative nutritional therapy should also be started if the patient has history of not eating for more than five days preoperatively or having low oral intake and/or have not achieved the recommended 50% intake for more than seven consecutive days. In this situation, it is recommended to start nutritional therapy (preferably in enteral route) without delay. ESPEN also recommended that patients with severe nutritional risk should receive nutritional therapy before major surgery within 7-14 days, even if the surgery would be delayed. The ESPEN recommendations also suggest that preoperative oral nutritional supplementation should be given to all cancers with malnutrition and to patients at high risk of major surgery with attention to the high-risk group[12].

To the best of our knowledge, there was no similar studies conducted in Makassar. Hence, this research would study about the relationship between nutritional status, prognostic nutritional index, duration of preoperative nutritional support for postoperative complications, and length of hospital stay of patients with gastrointestinal cancer at Wahidin Sudirohusodo Hospital in 2018-2021.

METHODS

Study Design

This is a *cross-sectional* study on gastrointestinal cancer patients who underwent surgery at Wahidin Sudirohusodo Hospital in 2018-2021. This study was conducted at Wahidin Sudirohusodo Hospital in August-December 2021 using medical record data.

Population and Research Samples

The population of this study is patients hospitalized at Wahidin Sudirohusodo Hospital who were diagnosed with gastrointestinal cancer and underwent surgery. The inclusion criteria for this study are patients diagnosed with gastrointestinal cancer based on the results of clinical, laboratory and histopathological examinations, more than 18 years old with gastrointestinal cancer who underwent surgery and referred to the Department of Nutrition prior to surgery. The exclusion criteria for this study are diagnosed with hepatobiliary cancers, sepsis before surgery, referred to Department of Nutrition after surgery, incomplete medical record documents, and emergency surgery.

Sample Size

The sample size in this study was determined using the total sampling method, which included all gastrointestinal cancer patients who underwent surgery and were treated at Wahidin Sudirohusodo Hospital Makassar in 2018-2021 that met the criteria.

Data Collection

Data collection was based on the diagnosis of gastrointestinal cancer in patients treated at Wahidin Sudirohusodo Hospital according to the criteria in 2018 – 2021. Data collection and analysis were carried out by comparing nutritional status, prognostic nutritional index, duration of preoperative nutritional support, postoperative complications and length of hospital stay gastrointestinal cancer patients. The data obtained was further analyzed using statistical tests and presented in the form of tables, graphs, or diagrams.

Data Processing and Analysis

The collected data underwent statistical analysis accordingly. The univariate analysis used for characteristics descriptions, and basic data in the form of frequency distributions, and were presented in tables. For bivariate analysis, *T-Test* was conducted if normal distributed data is obtained, or Mann-Whitney test would be conducted the data is not normally distributed. The statistic analysis was done using IBM SPSS Statistics for Windows. P value is used to determine significancy, which p value < 0.05 considered as significant.

Ethical Clearance

This study obtained ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, Hasanuddin University with the number: 539/UN4.6.4.5.31/PP36/2021 and granted permission from Wahidin Sudirohusodo Hospital.

RESULTS

Among 132 gastrointestinal cancer patients, 72 eligible patients were enrolled for further statistical analysis. The study involved 72 samples with a mean age of 54.1 (SD ± 11.2) years old, with 42 males (58.3%) predominating the subjects, compared to 30 females (41.6%). Regarding educational background, most 30 subjects graduated from high school (41.6%) and only 1 subject (1.5%) graduated with a master's degree. Most of the subjects were married (65 subjects, 90.2%) with the largest proportion of housewife, as many as 19 subjects (26.3%).

Based on the Subjective Global Assessment (SGA), most patients were in SGA B (Moderate Malnutrition) with a total of 38 subjects (52.7%), followed with 34 subjects in SGA C (47.2%). As many as 26 subjects (36.6%) has TLC > 1500 and only 11 subjects (15.5%) have TLC between 1200-1500. Twenty-six subjects (36.1%) albumin levels of 2.5-2.9 comprised the largest proportion of subjects, while the least among them was 12 subjects (16.6%) with serum albumin levels 3.6-5.0. A total of 41 subjects (56.9%) had PNI less than 35 and 31 subjects (43.1%) had PNI more or equal to 35. Based on the duration of preoperative nutrition support, 63 subjects (88.9%) were being treated for less than < 2 weeks while 9 subjects (11.1%) were being treated for more than equal to 2 weeks.

Based on the diagnosis, colon carcinoma made up the largest proportion with 25 subjects (34.7%), followed with 20 subjects (27.7%) diagnosed with rectal cancer, 19 subjects (23.3%) diagnosed with gastric cancer, 8 subjects (11.1%) diagnosed with esophageal cancer, and the least among them was small bowel cancer with a sum of two subjects (2.7%). Based on the indications of surgery, 21 subjects (29.1%) underwent surgery with indications of tumor removal, 30 subjects (41.6%) underwent surgery as curative treatment, and 19 subjects (26.3%) underwent surgery with the purpose of lifesaving. The average intake of preoperative meals was 945 ± 393 kcal with mean of total energy requirements preoperative was 1784.4 ± 313.1 kcal. Baseline characteristic data of our study subjects was shown in Table 1 below.

In this study, infection complications were found lower in *moderate* malnutrition patients with SGA B (13 patients, 34,2%), compared to severe malnutrition patients with SGA C (14 patients, 41.2%), as shown in table 2. The Chi-square test obtained a p-value of (0.715) > 0.05, which means that there was no significant relationship between the preoperative nutritional status with the onset of infectious complications.

This study observed that 16 subjects (39%) with PNI score less than 35 have experienced complications of infection, higher than those with PNI score greater than or equal to 35. The Chi-square test obtained a p-value of 0.951, which means there was no significant relationship between PNI preoperative with the onset of infectious complications.

Table 1. Baseline characteristic data

	Variable	Number of subjects (n)	%
Age		54.1 ± 11.2	
Sex	Male	42	58.3
	Female	30	41.6
Educational background	Primary School	19	26.3
	Secondary School	3	4.2
	High School	30	41.6
	Diploma	2	2.7
	Bachelor	9	12.5
	Master's Degree	1	1.5
	Others	8	11
Job	Labors	1	1.3
	Honorary	1	1.3
	Housewife	19	26.3
	Fisherman	1	1.3
	Retiree	7	9.7
	Farmers	14	19.4
	State Officials	7	9.7
	Police Officers/Army Forces	3	4.1
	Employees	1	1.3
	Entrepreneurs	15	20.8
	Unemployed	3	4.1
Marital Status	Widow/widower	4	5.5
	Married	65	90.2
	Single	3	4.1
Nutritional Status	Moderate Malnutrition	38	52.7
	Severe Malnutrition	34	47.2
SGA Category	B	38	52.7
	C	34	47.2

SGA: Subjective Global Assesment.

Table 1 continuation. Baseline characteristic data

	Variable	Number of subjects (n)	%
Preoperative TLC	< 800	20	27.7
	800-1199	14	19.7
	1200-1500	11	15.5
	>1500	26	36.6
Preoperative Albumin Level	< 2.5	13	18.1
	2.5-2.9	26	36.6
	3-3.5	21	29.1
	3.6-5	12	16.6
Preoperative PNI	< 35	41	56.9
	≥ 35	31	43.1
Duration of Preoperative Nutrition	< 2 weeks	63	88.9
	≥ 2 weeks	9	11.1
Comorbidities	Hypertension	12	16.6
	Diabetes Mellitus (DM)	4	5.5
	Hypertension and DM	3	4.1
	None	53	73.6
Diagnosis	Oesophageal cancel	8	11.1
	Gastric Cancer	19	26.3
	Intestinal Cancer	2	2.7
	Colon Cancer	25	34.7
	Rectal Cancer	18	25
Surgery Indications	Mass Removal	21	29.1
	Curative	30	41.6
	Life-saving	19	26.3
Length of Stay	< 2 weeks	9	12.5
	≥ 2 weeks	63	87.5
Mean calorie intake preoperative		945 ± 393	
Mean Estimated Energy Requirement preoperative		1784.4 ± 313.1	

TLC: Total Lymphocytes Count.

It was found that 5 subjects (12.2%) with PNI score less than 35 experienced worse surgical complications of compared to those scored greater than or equal to 35. The Chi-square obtained a p-value of 0.736, which means there was no significant relationship between PNI preoperative with the onset of surgery complications. The result was shown in Table 2.

Infections complications were found in 2 subjects who were treated with less than 2 weeks of preoperative nutritional support (22%), and 25 subjects were treated with more than 2 weeks of preoperative nutritional support (39.6%). From the results of statistical tests obtained a p-value of 0.107, which means that there was no significant relationship between the length of preoperative nutritional support with the incidence of infectious complications.

Regarding surgical complications, it was found in 1 patients were treated with less than 2 weeks of preoperative nutritional support (11.1%), and 9 subjects were treated with more than 2 weeks of preoperative nutritional support (14.2%). The Chi-square test obtained a p-value of 0.170, which means that the there was no significant relationship between length of preoperative nutritional support with the incidence of infectious complications.

In this study, higher proportion of subjects diagnosed with colon cancer (25 subejcts, 52%) in comparison to other gastrointestinal cancers. Most of the subjects were in moderate malnutrition (52%). Patients with gastrointestinal cancer were observed to have PNI score less than 35, and most subjects received perioperative nutritional support less than 5 days, shown in Table 3 below.

Based on nutritional status subjects of this study, 38 of them were moderate malnutrition and 34 of the subjects were assessed with severe malnutrition. Among subjects with moderate malnutrition, 6 subjects (15.8%) were hospitalized for less than 2 weeks, and 32 subjects (84.2%) were hospitalized for more than or equal to 2 weeks. Among subjects with severe malnutrition, 3 subjects (8.8%) were hospitalized for less than 2 weeks, and 31 subjects (91.2%) were hospitalized for more than or equal to 2 weeks. (table 4)

This study was showed that 41 subjects have preoperative PNI <35 and 31 subjects have PNI ≥ 35. Among all subjects with PNI less than 35, there were 4 subjects (9.8%) who had been hospitalized for less than 2 weeks, and 37 subjects (90.2%) who had been hospitalized for more than or equal to 2 weeks. Meanwhile, among subjects with PNI more or equal to 35, as many as 5 subjects (16.1%) stayed less than 2 weeks, and 26 respondents (83.9%) who stayed for more than 2 weeks. The statistical test obtained a p-value of (0.485) > 0.05, which means that there was no significant relationship between preoperative PNI and length of stay. The results were shown in table 4.

Table 2. The corrrelation of nutritional status, PNI, and duration of preoperative nutritional support with infectious and surgery complications of gastrointestinal cancer patients

Variable	Infectious Complications			Surgery Complications		
	Yes	No	p	Yes	No	p
Nutritional Status						
Moderate Malnutrition	13 (34.2%)	25 (65.7%)	0.715*	5 (13.2%)	33 (86.8%)	1.00*
Severe Malnutrition	14 (41.2%)	20 (58.8%)		2 (14.7%)	29 (85.3%)	
Preoperative PNI						
< 35	16 (39%)	25 (61%)	0.951*	5 (12.2%)	36 (87.8%)	0.736*
≥ 35	11 (35.5%)	20 (64.5%)		5 (16.1%)	26 (83.9%)	
Duration of Preoperative Nutritional Support						
< 2 weeks	2 (22%)	7 (77%)	0.107*	1 (11.1%)	8 (88.8%)	0.170*
≥ 2 weeks	25 (39.6%)	38 (60.3%)		9 (14.2%)	54 (85.7%)	

*Chi-square test; PNI = Prognostic Nutritional Index.

Table 3. Prevalence of gastrointestinal cancer

Variable	Esophageal Cancer	Gastric Cancer	Small Bowel Cancer	Colon Cancer	Rectal Cancer	Total	p
Nutritional Status							
Moderate Malnutrition	4 (50%)	10 (52.6%)	2 (100%)	13 (52%)	9 (50%)	38	0.810*
Severe Malnutrition	4 (50%)	9 (47.3%)	0 (0%)	12 (48%)	9 (50%)	14	
PNI Preoperative							
<35	5 (62.5%)	13 (68.4%)	0 (0%)	12 (48%)	11 (61.1%)	41	0.322*
≥35	3 (37.5%)	6 (31.5%)	2 (100%)	13 (52%)	7 (38.8%)	31	
Duration Nutritional Support							
<5 days	4 1(50%)	5 (26.3%)	2 (100%)	14 (56%)	12 (66.6)	37	0.126*
- 5-10 days	(12.5%)	8 (42.1%)	0 (0%)	8 (32%)	5 (27.7%)	22	
>10 days	3 (37.5%)	6 (31.5%)	0 (0%)	3 (12%)	1 (5.5%)	13	

*Uji Chisquare; PNI: Prognostic Nutritional Index.

Based on the duration of pre-operative nutritional support, 64 subjects were given pre-operative nutritional support for less than 2 weeks and only 8 subjects were treated for more than or equal to 2 weeks. Among those treated less than 2 weeks, there were 9 subjects (14.1%) who had a length of stay < 2 weeks and 55 subjects (85.9%) who had a length of stay of more than or equal to 2 weeks. Meanwhile, among those with pre-operative nutritional support for more than 2 weeks, all 8 subjects (100%) were hospitalized for more than 2 weeks. The statistical test obtained a p-value of 0.584, which means that there was no significant relationship between the duration of pre-operative nutritional support and the length of stay. (table 4)

Table 4. The correlation of nutritional status, PNI, duration of preoperative nutritional support and the length of hospital stay

Variable	Length of hospital stay		Total	p
	<2 weeks	≥ 2 weeks		
Nutritional Status				
Moderate malnutrition	6 (15.8%)	32 (84.2%)	38	0.485*
Severe malnutrition	3 (8.8%)	31 (91.2%)	34	
PNI				
< 35	4 (9.8%)	37 (90.2%)	41	0.485*
≥ 35	5 (16.1%)	26 (83.9%)	31	
Duration of Preoperative Nutritional Support				
<2 weeks	9 (14.1%)	55 (85.9%)	64	0.584*
≥ 2 weeks	0 (0.0%)	8 (100%)	8	

* Chi-square test; PNI = Prognostic Nutritional Index.

Based on the duration of preoperative nutritional support, 64 subjects were treated with preoperative nutrition support for less than 2 weeks, and 8 subjects were treated with pre-operative nutrition support for more than 2 weeks. Among subjects with preoperative nutritional support less than 2 weeks, as many as 19 subjects (29.7%) were hospitalized for less than 2 weeks after surgery, and 45 subjects (70.3%) were hospitalized for more than 2 weeks after surgery. Meanwhile, among subjects with pre-operative nutritional support for more than 2 weeks, 6 subjects (75%) were hospitalized for less than 2 weeks after surgery and 2 subjects (25%) were hospitalized for more than 2 weeks after surgery. The statistical test was performed and resulted in a p-value of 0.018, which means that there was a significant relationship between the duration of nutritional support and the length of stay. The result were shown in table 5.

DISCUSSION

The Correlation of Nutritional Status, Prognostic Nutritional Index, and Duration of Preoperative Nutritional Support to Postoperative Complications of Gastrointestinal Cancer Surgery

Cancer patients, especially those who have gastrointestinal malignancy, are at risk of malnutrition. Malnutrition in cancer patients could increase surgery complications and prolong length of stay, leading to poor treatment outcomes, and increased mortality. Malnutrition is not only associated with an increase in postoperative complications but also with poor long-term outcomes[7]. Anemia in one example. Anemia in cancer patients can occurred because of inflammation (chronic disease anemia)[13], and also postoperative complication in

Table 5. The correlation between duration of preoperative nutritional support and postoperative length of hospital stay

Characteristics	Postoperative Length of hospital stay		Total	p
	<2 weeks	≥ 2 weeks		
Duration of Preoperative Nutritional Support				
<2 weeks	19 (29.7%)	45 (70.3%)	64	0.018*
≥ 2 weeks	6 (75%)	2 (25%)	8	

* Chi-square test.

general. Hence it is important to give medical nutrition therapy to prevent further anemia due to malnutrition.

Malnutrition has been resulted in disorders at cellular, physical, and psychological levels. At the cellular level, malnutrition interferes the body's ability to strengthen the immune response during infection, increases the risk of decubitus ulcers, decelerates wound healing, increases the risk of infection, decreases intestinal absorption, alters thermoregulation, and interferes with renal function. Physically, malnutrition could lead to loss of muscle mass and fat, decreased function of the respiratory and cardiac muscles, and atrophy of visceral organs. It has been proven that a 15% decrease in body weight leads to a decrease in muscle strength and respiratory function, while 23% weight loss is associated with a 70% decrease in physical strength, 30% in muscle strength and a 30% increase of the depression incidence. Psychologically, malnutrition is associated with fatigue and apathy, which delays recovery, aggravates anorexia and decelerates healing time[7,14].

The infectious complications that were observed in this study were sepsis and leukocyte increase in patients with moderate and severe malnutrition, as occurred in 27 respondents (37.5%). Infectious complications in malnourished patients might occur due to a close relationship between malnutrition and infection. It depicted a vicious cycle where infection triggers malnutrition, and on the other side, malnutrition aggravates the condition of infection. Malnutrition conditions were accompanied by micronutrient deficiencies, due to decreased food intake, increased nutritional needs and disorders in immune system that resulted in individuals with malnutrition susceptible to infection[7].

This study revealed that surgical complications could also occur in patients with both moderate and severe malnutrition. The incidence of anastomosis dehiscence was present in 2 respondents (2.7%), operative wound dehiscence in 2 respondents (2.7%), and need of repeated surgery was observed in 4 respondents (5.5%). Malnutrition was associated with decreased muscle function, respiration function, immune responses, and quality of life, as well as disruptions in the wound healing process. This leads to increased length of stay and costs incurred by patients, and high incidence or risk of hospitalization complications.

A previous study by Nurpudji *et al* in Wahidin Sudirohusodo Hospital Makassar found that the nutritional status, food intake, albumin level, and hemoglobin level played important role in wound healing and length of hospitalization in patients undergoing digestive surgery[15]. Fauzan, *et al*, found that snakehead fish extract capsule can have a positive effect on albumin levels and protein intake in patient with hypoalbuminemia[16]. So that it can provide a good effect for healing process.

PNI was used as a predictor of short- and long-term postoperative outcomes in patients with cancer. Preoperative hypoalbuminemia was associated with poor wound healing, reduction in collagen synthesis, and the formation of granulomas in surgical wounds that certainly altered wound healing[10,11].

A study conducted by Jiang *et al* concluded that PNI was a simple and useful marker for identifying patients at increased risk of postoperative complications and predicting long-term survival after total gastrectomy. Another study conducted by Cao et al stated that PNI is a valuable biomarker in predicting the prognosis of complication of colorectal cancer patients who underwent curative laparoscopic surgery[17,18].

Perioperative nutritional support aims to minimize negative balance of protein level by preventing starvation, maintaining muscle, immune, and cognitive function, and promoting postoperative recovery. Perioperative nutritional support was found to be highly beneficial in moderate- to severely-malnourished patients if given 7–14 days prior surgery, but the potential benefits need to be weighed against the potential of nutritional risks and surgery delay[8,12].

The correlation between nutritional status, Prognostic Nutritional Index, duration of preoperative nutritional support, and length of hospital stay in patients with gastrointestinal cancer

We found no significant relationship between nutritional status and length of stay. This could be because many medical record documents were incomplete, so that number of samples obtained were insufficient. It could also be caused by other factors such as age, comorbidities, and surgical complications which occurred. This study did not compare between patients with normal nutritional status and malnutrition. Nutritional support for surgical care is important, as malnutrition was found to be common in hospitalized patients. However, low- and middle-income countries have not adequately addressed the nutritional management of surgical patients. Malnourished patients undergoing gastrointestinal cancer surgery were more likely to have postoperative complications and longer length of stay.

Poor nutritional status was related to prolonged length of stay, resulted in increased health care costs. In addition, malnutrition-related complications contribute to increased length of hospital stay and healthcare costs. Length of stay increases the risk of hospital-acquired infections in patients. Furthermore, the high prevalence of hospitalized patients at risk of malnutrition or malnutrition would contribute to the workload of healthcare workers as it requires more nursing care due to higher rates of infection, complications, pressure ulcers, medications, and decreased functional capacity. This could lead to hospitalized-related malnutrition contributing to morbidity and mortality.

Patients with low preoperative PNI were at high risk for postoperative complications, therefore preoperative PNI val-

ues could affect both short- and long-term postoperative outcomes[19,20]. A study by Jiang et al showed that low PNI affects the immunonutrition status, in which it lowers the immune system against tumors and increases its burden, which leads to residual tumor cell growth and was associated with poorer prognostic conditions in advanced stages of cancer after total gastrectomy. Preoperative PNI, which could be easily measured before surgery, could be used in practice to identify increased risk of postoperative complications of a patient and predict long-term survival after surgery[18].

Preoperative nutritional support played an important role in the preoperative management of patients prior to the surgery. It helps to restore proper nutritional status, resulted in reduction in postoperative complications risk. According to published guidelines implemented worldwide, preoperative nutritional support should be provided for 10-14 days prior to surgery. However, these guidelines were generally applied to malnourished patients requiring intensive nutritional support with a specific diet, yet to conform the clinical pathways of respective hospital. According to the ESPEN guidelines, weight loss for more than 10% in 6 months was a risk factor for postoperative complications, and was a threshold value of malnutrition[21].

A study from Kabata et al analyzed 113 patients without malnutrition. It found that preoperative nutritional support was beneficial, therefore recommended to be routinely applied in stomach and gastrointestinal cancer patients without clinical signs of malnutrition. The respective approach could reduce the number and severity of postoperative complications, especially wound dehiscence and anastomotic leakage[21].

Preoperative nutritional support was found to be beneficial and should be routinely provided in patients with stomach and gastrointestinal cancers, even without clinical signs of malnutrition. Such an approach reduces the number and severity of postoperative complications, particularly dehiscence and anastomotic leakage. If oral nutritional supplementation without immunomodulatory agents was given for 14 days, the number of postoperative complications in gastrointestinal cancer patients was reduced[21].

A study by Jie Bin et al evaluated the effect of preoperative nutritional support on clinical outcomes in patients at nutritional risk as defined by the NRS-2002. Among patients with an NRS score of at least 5, a lower complication rate was found in patients who received preoperative nutritional support. In addition, the length of hospital stay was not prolonged because the postoperative length of stay was shorter in the group that was given preoperative nutritional support for more than 7 days[18].

STUDY LIMITATIONS

The study was conducted based on medical record data of patients treated at Wahidin Sudirohusodo Hospital Makassar who met the inclusion and exclusion criteria. Out study limitation was incomplete medical record documentations. The use of medical record data limits our data collection, as not complications were recorded properly conforming to diagnostic coding.

CONCLUSION

There is a relationship between the duration of preoperative nutritional support and postoperative length of hospital stay in patients with gastrointestinal hospitalized at the Wahidin Sudirohusodo Hospital in 2018-2021.

REFERENCES

1. Bunawan NC, Suseno D, Dillon DHS, Rinaldi I, Purnamasari D. Risk Factors for Undernutrition at Admission Among Adult Hospitalized Patients at a Referral Hospital in Indonesia. SAGE Open [Internet]. 2021;11(5):1–6. Available from: https://doi.org/10.1177/215824402098331

2. Xie H, Tang S, Wei L, Gan J. Geriatric nutritional risk index as a predictor of complications and long-term outcomes in patients with gastrointestinal malignancy: a systematic review and meta-analysis. Cancer Cell Int [Internet]. 2020;20(1):1–12. Available from: https://doi.org/10.1186/s12935-020-01628-7

3. Marsella, C. P., Taslim, N. A., Syam, N., Syauki AY. Medical Nutrition Therapy in Hemodynamically Unstable Patients Due to Cardiogenic Shock with Infected Bronchiectasis and Severe Protein-Energy Malnutrition. Gac Sanit [Internet]. 2021;35(S2):s506–9. Available from: https://doi.org/10.1016/j.gaceta.2021.10.081

4. Wahyuni, D., Taslim, N. A., Syam, N., Virani D. Medical Nutritional Therapy in Infected Bronchiectasis with Impending Respiratory Failure: A Case Report. Gac Sanit [Internet]. 2021;35(S2):S515–8. Available from: https://doi.org/10.1016/j.gaceta.2021.10.083

5. Sutisna NS, As'ad S, Taslim NA, Madjid M, Safitri A. Glutamine for sepsis in severe protein energy malnutrition: A case report in clinical nutrition perspective. Clin Nutr ESPEN. 2021;46:S652.

6. Daud, N. A., Madjid, M., Rahardjo F. Nutritional Status, Hemoglobin, and Total Lymphocyte Count Factors Readmission in Head and Neck Cancer Patients. Clin Nutr ESPEN [Internet]. 2020;40:563. Available from: https://doi.org/10.1016/j.clnesp.2020.09.470

7. Subagio HW. Malnutrition in Hospital. Majalah Gizi Medik Indonesia. 2019;

8. RI D. National Guidelines for Medical Services: Management of Adult Malnutrition. Perhimpun Dr Spes Gizi Klin (Vol 1, Issue 1) Kementeri Kesehat Republik Indones [Internet]. 2017;vol.1(issue 1). Available from: https://doi.org/10.7454/jki.v1i1.7806

9. Bukhari, A., Taslim, N. A., As'ad, S., Rasyid, H., Aminuddin, Muchtar, F., Rosdiana, R., Umrayani, Rusli C. Comparison of Different Early Enteral Feeding Formulas on Critically Ill Patients. J Nutr Sci Vitaminol [Internet]. 2020;66:S2–10. Available from: https://doi.org/10.3177/jnsv.66.s2

10. Luvián-Morales, J., González-Trejo, S., Carrillo, J. F., Herrera-Goepfert, R., Aiello-Crocifoglio, V., Gallardo-Rincón, D., Ochoa-

Carrillo, F. J., & Oñate-Ocaña LF. Association of the prognostic nutritional index and overall survival in patients with colorectal cancer: A STROBE compliant retrospective cohort study. Cancer Med [Internet]. 2019;8(7):3379–3388. Available from: https://doi.org/10.1002/cam4.2212

11. Ucar, G., Ergun, Y., Acikgoz, Y., & Uncu D. The prognostic value of the prognostic nutritional index in patients with metastatic colorectal cancer. Asia Pac J Clin Oncol [Internet]. 2020;16(5):e179–e184. Available from: https://doi.org/10.1111/ajco.13328

12. Weimann, A., Braga, M., Carli, F., Higashiguchi, T., Hübner, M., Klek, S., Laviano, A., Ljungqvist, O., Lobo, D. N., Martindale, R. G., Waitzberg, D., Bischoff, S. C., & Singer P. ESPEN practical guideline: Clinical nutrition in surgery. Clin Nutr ESPEN [Internet]. 2021;40(7):4745–4761. Available from: https://doi.org/10.1016/j.clnu.2021.03.031

13. Bukhari A, Hamid F, Minhajat R, Sutisna NS, Marsella CP. Non-nutritional and disease-related anemia in Indonesia: A systematic review. Asia Pac J Clin Nutr. 2020;29:41–54.

14. Leandro-Merhi V. A, Aquino J. L. B and OMR. Nutritional Status and Length of stay. In: Rajendram R, editor. Diet and Nutrition in Critical Care. New york: Springer Science; 2015. p. 279–92.

15. Said, S., A. Taslim, N., & Bahar B. Relationship between BMI and albumin levels with wound healing. J Keperawatan Padjadjaran [Internet]. 2016;v4(n1):60–69. Available from: https://doi.org/10.24198/jkp.v4n1.6

16. Fauzan, MR., Dahlan, CK., Taslim, NA., Syam A. The effect of giving fish extract (Pujimin Plus) on intake of protein and hemoglobin hypoalbuminemic patients. Enferm Clin [Internet]. 2020;30(S4):452-455. Available from: https://doi.org/10.1016/j.enfcli.2020.03.009

17. Cao, X., Zhao, G., Yu, T., An, Q., Yang, H., & Xiao G. Preoperative Prognostic Nutritional Index Correlates with Severe Complications and Poor Survival in Patients with Colorectal Cancer Undergoing Curative Laparoscopic Surgery: A Retrospective Study in a Single Chinese Institution. Nutr Cancer [Internet]. 2017;69(3):454–463. Available from: https://doi.org/10.1080/01635581.2017.1285038

18. Jie, B., Jiang, Z. M., Nolan, M. T., Zhu, S. N., Yu, K., & Kondrup J. Impact of preoperative nutritional support on clinical outcome in abdominal surgical patients at nutritional risk. Nutrition [Internet]. 2012;28(10):1022–1027. Available from: https://doi.org/10.1016/j.nut.2012.01.017

19. Hafsah, T., Prawitasari, T., & Djais JTB. Hospital malnutrition and pediatric nutrition care at Hasan Sadikin Hospital Bandung. J Gizi Klin Indones [Internet]. 2019;16(2):47. Available from: https://doi.org/10.22146/ijcn.43090

20. Hirahara, N., Tajima, Y., Fujii, Y., Kaji, S., Yamamoto, T., Hyakudomi, R., Taniura, T., & Kawabata Y. Prognostic nutritional index as a predictor of survival in resectable gastric cancer patients with normal preoperative serum carcinoembryonic antigen levels: A propensity score matching analysis. BMC Cancer [Internet]. 2018;18(1):1–11. Available from: https://doi.org/10.1186/s12885-018-4201-4

21. Kabata, P., Jastrzębski, T., Kąkol, M., Król, K., Bobowicz, M., Kosowska, A., & Jaśkiewicz J. Preoperative nutritional support in cancer patients with no clinical signs of malnutrition—prospective randomized controlled trial. Support Care Cancer [Internet]. 2015;23(2):365–370. Available from: https://doi.org/10.1007/s00520-014-2363-4