THE CORRELATION BETWEEN TOTAL CALORIE AND PROTEIN INTAKE WITH SERUM ALBUMIN LEVEL OF POST-SURGICAL PATIENTS

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ABSTRACT

Introduction: Post-surgery diet is a set of foods that are given to patients after surgery. Nutritional management in post-surgical patients are often neglected despite the fact that patients require additional calories due to metabolic stress. Nutritional deficiency can impair wound healing since it is a process that requires protein to form collagen tissue. **Aim:** This study aims to determine the relationship between total calories and protein intake with serum albumin level of post-surgical patients.

Methods: This study used an observational analytic design with cross-sectional approach. The sample was gathered using consecutive sampling technique. Study population were all post-surgical patients of Dr. Mohammad Soewandhie Hospital Surabaya aged 30-64 years whose medical records taken in June 2016. There are 32 respondents who met the inclusion criteria.

Result: There was a significant correlation between the total calories intake with serum albumin level ($r = 0.354$; $p = 0.047$) and between total protein intake with serum albumin level ($r = 0.545$; $p = 0.001$). **Conclusion:** There is a positive correlation between total calories and protein intake with serum albumin level in post-surgical patients.

Keywords: post-surgical patients, calories intake, protein intake, serum albumin.

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INTRODUCTION

Post-surgical dietis a set of foods given to patients after surgery. Food regulation after surgery depends on the type of surgery and the type of comorbidities, but also influenced by patient knowledge and patient social culture. Nutritional management is a priority to reduce nutrient loss during periods of hypermetabolism and to speed up the healing process[(1)].

Nutrition care is often gets ignored, whereas with good nutrition, hospital malnutrition can be prevented. WHO data shows that for more than a century, surgical care has become an important component of health care throughout the worldEvery year there are an estimated 234.2 million surgical procedures performed worldwide. The results of various studies conducted in developed and developing countries, found the prevalence of malnutrition in hospitals reached 40%, Sweden 17-47%, Denmark 28%, and in other countries such as America and the UK the figure was between 40-50% [(2)].

A study in Indonesia conducted in Jakarta said that about 20-60% of patients who had malnutrition status and 69% had decreased nutritional status during hospitalization. A study at Tabanan hospital showed that postoperative laparotomy patients who were malnourished were 52.6% [(3)]. Based on the results of these studies, there are still problems with the care of the nutrition of hospital patients.

According to Barker, malnutrition in hospitals is a combination of factors between underlying diseases, diseases related to changes in metabolism, and reduced supply of nutrients. According to Ratna, patients need nutritional intake that is in accordance with the conditions or needs of the patient's body to prevent malnutrition.The human body carries out health maintenance by replacing damaged tissue to maintain its survival [(4)].

Surgery is an invasive action that damages the structure of the body's tissues where there will be a metabolic phase in the healing process. Patients with nutritional deficiencies who will undergo surgery will experience impaired wound healing. This wound healing process requires protein as a basis for forming collagen tissue. The optimal need for protein in the body can be described from the amount of albumin in the blood serum. Dickhaut's study states that only 1 in 4 diabetic patients with hypoalbuminemia experience post-amputation primary wound healing[(5)]

METHODS

The research design used was analytical research with observational studies and cross-sectional study methods.Data collection on patient characteristics is done by looking at medical records and interviewing patients.Collection of patient diet data will be conducted by interviewing the patient's diet 24 hours before the interview and collecting nutritional status data for the patient by measuring serum albumin levels

The inclusion criteria of this study were general poly surgical patients aged 30-64 years who had undergone surgery at Dr. Mohammad Soewandhie Surabaya and is in the late postoperative period for the next 7 days (day 4-14 after surgery); there are data on age, sex, and type of surgery in the patient's medical record. The exclusion

criteria for this study were patients who had a history of liver cirrhosis, severe burns, pregnancy, nephrotic syndrome, cancer, colitis, congestive heart failure, infection, dehydration, continuous vomiting and severe diarrhea. The study sample was said to drop out if the study sample did not follow the research procedure for any reason.

The data analysis technique in this study was bivariate analytical data analysis. The second scale of data is in the form of a ratio and will be converted into an ordinal data scale in the statistical test.The relationship test used is Rank Spearman correlation test. The analysis was carried out using the SPSS Version 22 program. The value of α was set at 0.05, so the relationship between variables was considered significant if the value of p <0.05.

RESULT

Distribution of respondents in this study, namely, as many as 18 samples (56.25%) aged 30-49 years and 14 samples (43.75%) aged 50-64 years; as many as 10 samples (31.25%) were male and 22 samples (68.75%) were female; 28 samples (87.5%) were Javanese and 4 samples (12.5%) were Madurese; 29 samples (90.6%) were Muslim and 3 were (9.4%) were Christians; the majority of the samples were educated to high school (46.9%). However, many also have low education (elementary and junior high school), which is as many as 16 samples (50%); 29 samples (90.6%) underwent major surgery and 3 samples (9.4%) underwent minor surgery

There are 3 samples (9.4%) that have a total calorie intake of ≥90% of the recommended amount.Meanwhile, most of the sample (90.6%) experienced a total calorie intake deficit. The total calorie intake of the sample in this study had the lowest value of 608,125 calories (29.1% daily calorie needs), the highest amounted to 2,748.9 calories (107.48% daily calorie needs), and an average of 1,659,084 calories

There were 12 samples (37.5%) having a total protein intake of ≥90% of the recommended amount.Meanwhile, most of the sample (62.5%) experienced a deficit in total protein intake. The total protein intake of the sample in this study had the lowest value of 19.265 grams (30.73% of daily protein requirements), the highest was 99.795 grams (159.16% of daily protein requirements), and an average of 56.098 grams

There were 4 samples (12.5%) having less serum albumin levels and 28 samples (87.5%) having adequate serum albumin levels. The serum albumin level in this study had the lowest value of 3.1 gr / 100 ml, the highest was 4.7 gr / 100 ml, and the average was 4 gr / 100 ml. In this study, the reference value of serum albumin levels used was≥3,5 gr/100 ml. Meanwhile, the reference value used by the laboratory installation Dr. Mohammad Soewandhie Surabaya is 3.4-4.8 gr / 100ml.

From table 1 it was found that as many as 4 samples (12.5%) had serum albumin levels of less than 3.5 gr / 100ml.The four samples were patients with a severe deficit in total calorie intake.

Based on the analysis of the relationship between total calorie intake and serum albumin levels, p = 0.024 with a correlation coefficient r = 0.354. It was concluded that there was a significant relationship between total calorie intake and serum albumin levels.The r value of

0.354 indicates a weak relationship (r = 0.20-0.399) between the total calorie intake and serum albumin levels. The correlation direction is positive so that it can be explained that the lower the total calorie intake, the lower the serum albumin level of postoperative patients.

Table 1 Sample Distribution in Dr. Hospital Mohammad Soewandhie Surabaya Period 8-28 June 2016 Based on Total Calories Intake and Serum Albumin Levels

			***Serum albuminlevel* (gr/100 ml)**		**Total**	**p**
			<3,5	≥3,5		
Total Calories Intake	<70%	n	4	12	16	0,024
		%	25	75	100	
	70-79%	n	0	7	7	
		%	0	100	100	
	80-89%	n	0	6	6	
		%	0	100	100	
	90-119%	n	0	3	3	
		%	0	100	100	
Total		n	4	28	32	
		%	12,5	87,5	100,0	

Tabel 2 Sample Distribution in Dr. Hospital Mohammad Soewandhie Surabaya Period 8-28 June 2016 Based on Total Calories Intake and Serum Albumin Levels

			***Serum albumin level* (gr/100 ml)**		**Total**	**p**
			<3,5	≥3,5		
Total Protein Intake	<70%	n	4	2	6	0,001
		%	66,7	33,3	100,0	
	70-79%	n	0	9	9	
		%	0	100	100	
	80-89%	n	0	5	5	
		%	0	100	100	
	90-119%	n	0	7	7	
		%	0	100	100	
	≥120%	n	0	5	5	
		%	0	100	100	
Total		n	4	28	32	
		%	12,5	87,5	100,0	

From table 2 it was found that as many as 4 samples (12.5%) had serum albumin levels of less than 3.5 gr / 100ml.The four samples were patients with severe deficits in total protein intake. Based on the analysis of the relationship between total protein intake and serum albumin levels, p = 0.001 with a correlation coefficient r = 0.545. It was concluded that there was a significant relationship between total protein intake and serum albumin levels. R value of 0.545 indicates between total protein intake and serum albumin level. The correlation direction is positive so that it can be explained that the lower the total protein intake, the lower the serum albumin level of postoperative patients.

DISCUSSION

Calories are the energy source that humans need to live.Based on the calculations of researchers according to the AKG, it was found that the majority of the sample (90.6%) experienced a total deficit in calorie intake probably due to a lack of food consumed by the individual and a decrease in post-surgical appetite.

Albumin is a major component of proteins that make up more than half of plasma proteins (55% -60%). The function of albumin is to help the formation of new cell tissue and the recovery of damaged body tissue.Hypoalbuminemia can occur due to stress, inflammation, infection, trauma, surgery, cancer, and wound healing. In addition, continuous lack of nutrients will result in low serum albumin levels as a result of protein deficiency [(6)].

In this study, 4 samples (12.5%) who had serum albumin levels of less than 3.5 gr / 100ml were patients with a severe deficit in total calorie intake.However, samples that had a minimum or sufficient total calorie intake tended to have normal serum albumin levels.This may be caused by the majority of the diet of respondents who did not fast more than 18 hours, so that even though there was a total calorie intake deficit at interview, calories or energy were obtained from glucose derived from glycogenolysis of liver and muscle glycogen.

Based on the analysis of the relationship between total calorie intake and serum albumin levels, p = 0.024 with a correlation coefficient r = 0.354. It was concluded that there was a significant relationship between total calorie intake and serum albumin levels.Lack of total calorie intake is one of the causes of malnutrition. Malnutrition is one of the causes of decreased serum albumin levels [(6)].

As a result of calorie deficiency, signs and symptoms of protein deficiency can arise if protein is used to meet energy requirements and decrease excess weight [(6)].As a result of calorie deficiency, the signs and symptoms of protein deficiency can arise if energy is used to meet energy requirements and decrease excess weight [(6)].

During the growth period, protein synthesis is more than solving, whereas in disposal conditions (e.g. hunger, cancer, and after surgery or trauma), the solution is greater than synthesis [(8)]. Based on the calculations of researchers according to the AKG, it was found that the majority of the sample (62.5%) had a deficit in total protein intake. This may be due to a lack of protein intake.

As explained earlier, there were only 4 samples (12.5%) who had serum albumin levels of less than 3.5 gr /

100ml.The four samples were patients with severe deficits in total protein intake.However, samples that had fewer or sufficient total protein intake tended to have normal serum albumin levels. This may be caused by the insufficient energy reserves from fat and carbohydrates in the body as a substitute for less energy intake, or because tissue damage due to surgery is minimal, or maybe because of the long half-life of albumin which is around 14-20 days so there is a possibility although there is a total deficit in protein intake during interviews, serum albumin is still within normal limits as a result of total protein intake before the operation takes place.

In the case of surgery, there is an increase in catabolism of tissue proteins. Total body protein can be lost up to 6-7% in 10 days. This loss of protein can be replaced if a person's normal diet is sufficient. Meanwhile, albumin synthesis has decreased relatively early in conditions of protein malnutrition [(7)].

Based on the analysis of the relationship between total protein intake and serum albumin levels, p = 0.001 with a correlation coefficient r = 0.545. It was concluded that there was a significant relationship between total protein intake and serum albumin levels.Protein is needed to replace body muscle mass during the catabolic phase after surgery, to restore blood volume and lost plasma protein, to replace losses caused by increased immobility or excretion, and to meet the increased need for tissue repair and resistance to infection [(6)].

As a result of protein deficiency, there is significant weight loss, damage or slowdown in wound healing, shock associated with decreased blood volume, edema associated with decreased serum albumin, diarrhea associated with decreased albumin, anemia, increased risk of infection associated with antibodies and damage to tissue integrity, decrease in the synthesis of lipoprotein causing liver damage, and increased mortality [(6)].

Decreasing albumin levels in plasma can be used as an indication of protein deficiency in the body and is one sign of the occurrence of malnutrition [(9)]. Someone with low protein energy intake, the speed of synthesis decreases rapidly and consequently the albumin balance becomes negative [(10)].

In this study, researchers realized that in carrying out this study there were still many shortcomings. This is because this research is an analytical study with a cross sectional study method, so it only presents the current phenomenon;this study did not analyze patient characteristics data to determine whether or not there was a relationship with total calorie intake and postoperative protein;this study is susceptible to information bias regarding food and beverage intake because this study uses the 24 hour recall method that relies on respondents' memory. In addition, this method can produce data that is less representative if only done once, because it cannot describe individual eating habits [(11)];this research was only carried out by the researcher and only in postoperative patients with poly general surgery, so the study time was longer and needed more energy and patience for the researcher.

CONCLUSION

From this study, conclusions can be summarized as follows:

1. Total calorie intake has a positive relationship with serum albumin

levels in postoperative patients.The lower the total calorie intake, the lower the serum albumin level of postoperative patients, and otherwise.

2. Total protein intake has a positive relationship with serum albumin levels in postoperative patients. The lower total protein intake, the lower the serum albumin level of postoperative patients, and otherwise.

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