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Perioperative Nutritional Status of Digestive Surgery Laparotomy Surgery

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ABSTRACT

Introduction: Laparotomy is one of the most frequently performed surgical procedures. Surgery causes a stress response that increases the risk of experiencing malnutrition, especially in patients undergoing laparotomy. Malnutrition can increase the risk of adverse outcomes in postoperative patients. This study aims to evaluate perioperative nutritional status in patients who will undergo laparotomy surgery at Haji Adam Malik General Hospital.
Method: This research is an observational study with a prospective design. This study involved 65 research subjects withthe sampling technique was carried out by non-probability sampling, namely consecutive sampling.
Results: The majority of study subjects had BMI ≥18.5, without weight loss >3.6 kg in the last 6 months, without a history of food intake <50% portion in the last 1 week, and albumin value ≥3.0 pre- and post- operative. Postoperatively. The number of subjects with PONS value ≥1 changed from 33.85% before surgery to 52.31% after surgery. There was a significant change in PONS values before and after laparotomy (p = 0.001).
Conclusion: Statuspost-operative nutritional study subjects decreased compared to before surgery. A significant increase in PONS scores also occurred after laparotomy.

Keywords

Laparotomy, perioperative nutrition, PONS, albumin

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INTRODUCTION

Malnutrition is still a challenge in health and is often found in hospitalized patients.[1,2] Globally, data from recent studies suggest that 19-59% of hospitalized adult patients have a malnourished status, with higher rates found in low- and middle-income countries.[3–8]

Individuals with malnutrition may have several co-morbidities that predispose to this condition, such as HIV, organ failure, cancer, metabolic syndrome, and other diseases accompanied by persistent moderate inflammation. Preoperative malnutrition can also be caused by a poor diet, which is defined as a chronic nutritional state in the absence of inflammation

Laparotomy is a surgical procedure involving a large incision in the abdomen with the aim of gaining access to the peritoneal cavity.[9] Laparotomy is one of the most frequently performed surgical procedures. In 2018-2019, data obtained that around 30,000 emergency laparotomy procedures are performed in the UK each year.[10] In 2009, it was reported that laparotomy accounted for 32% of the total surgical procedures performed in Indonesia.

Evidence-based recommendations are available to guide nutritional care in the perioperative period. Preoperative nutritional therapy recommendations depend on the patient's nutritional status. Therefore, all patients should be evaluated for risk of malnutrition before surgery and evaluated by a dietitian if identified as

having high risk.[8,11] On the day of surgery, the European Society of Anesthesiology recommends consuming solid food a maximum of 6 hours before surgery. Consumption of clear liquids is allowed up to 2 hours before surgery. The Enhanced Recovery After Surgery (ERAS) protocol shows significant benefits for patients undergoing gastrointestinal surgery, namely preoperative carbohydrate loading with clear liquid drinks to reduce postoperative insulin resistance, nausea and vomiting. After surgery, the majority of patients can resume a normal diet.[12] There is no evidence that gastric decompression or fasting after surgery has a beneficial effect.

Katundu et al performed an observational study of perioperative nutrition in patients undergoing laparotomy. This study found that 52% of patients suffered from moderate malnutrition and 28% of them suffered from severe malnutrition. In addition to high rates of malnutrition, this study also concluded that nutritional support during treatment was inadequate, which is associated with poor clinical outcomes.[13]

METHOD

This study is an observational study with a prospective design to evaluate perioperative nutritional status in patients undergoing laparotomy. The population in this study were all laparotomy patients at Adam Malik Haji Center General Hospital. The research sample was all patients undergoing laparotomy at Adam Malik Haji Center General Hospital when the study was conducted. The number of samples is 65 samples. All data was collected, processed and computerized statistical tests were carried out. Quantitative data analysis was carried out in stages, namely univariate (one variable) and bivariate (two variables) analysis.

RESULTS

This study involved 65 subjects who underwent elective or emergency laparotomy. The baseline characteristics of the study subjects are shown in Table 1.

Table 1. Characteristics of Research Subjects

Characteristics	Frequency	Percentage (%)
Gender		
Woman	33	50.77
Man	32	49.23
Age		
≤25 years	4	6.15
26-45 years	30	46.15
46-65 years	31	47.70
Education		
JUNIOR HIGH SCHOOL	6	9.23
SENIOR HIGH SCHOOL	36	55.38
Bachelor	23	35.38
Operation indication		
Tumors / malignancies	25	38.46
Acute abdomen	13	20
Gall system stones	10	15.38
traumatized	4	4.62
Other	14	21.54

Based on gender, the distribution of research subjects was almost even, where 50.77% were women and 49.23% were men. The majority (47.70%) of the subjects belonged to the age group of 46-65 years, with a subject age range of 20-65 years. More than half (55.38%) of subjects had high school education, followed by undergraduate education (35.38%), and the least with junior high school education (9.23%). There are no subjects with elementary education.

The most common indication for laparotomy in research subjects was tumors or malignancies (38.46%). Other pathological conditions are the second most common indication with a percentage of 21.54%. This situation such as anastomotic leak, massive ascites, surgical site infection, etc. The third most common cause is acute abdomen (20%), followed by stones in the biliary system (15.38%), and trauma (4.62%). Perioperative

nutrition was measured using the Perioperative Nutrition Screen (PONS) which includes measurements of: body mass index (BMI), history of weight loss, history of food intake, albumin, and vitamin D.

Preoperative nutrition based on PONS is shown in Table 2. The characteristics of the study subjects were dominated by BMI ≥18.5 (93.85%), without weight loss >3.6 kg in the last 6 months (89.23%), without a history of food intake <50% portion in the last 1 week (86.15%), albumin value ≥3.0 (84.62%), and with a PONS value of 0 (66.15%). In all study subjects, vitamin D examination was not performed before surgery.

Table 2. Preoperative Nutrition

Parameter	Frequency	Percentage (%)
body mass index		
Value 1	4	6.15
Value 0	61	93.85
History of weight loss		
Value 1	7	10.77
Value 0	58	89.23
History of food intake		
Value 1	9	13.85
Value 0	56	86.15
Albumin		
Value 1	10	15.38
Value 0	55	84.62
PUNCH		
Value ≥1	22	33.85
Value 0	43	66.15

Postoperative nutrition based on PONS is shown in Table 3. The characteristics of the study subjects were dominated by BMI ≥18.5 (93.85%), without weight loss >3.6 kg in the last 6 months (76.92%), without a history of food intake <50% servings in the last 1 week (76.92%), albumin value ≥3.0 (75.38), and with PONS value ≥1 (52.31%). In all study subjects, no vitamin D examination was performed after surgery.

Table 3. Postoperative Nutrition

Parameter	Frequency	Percentage%
body mass index		
Value 1	4	6.15
Value 0	61	93.85
History of weight loss		
Value 1	15	23.08
Value 0	50	76.92
History of food intake		
Value 1	15	23.08
Value 0	50	76.92
Albumin		
Value 1	16	24.63
Value 0	49	75.38
PUNCH		
Value ≥1	34	52.31
Value 0	31	47.69

Based on Tables 2 and Table 3, the number of subjects with BMI <18.5 kg/m2 did not change before and after surgery. There is an increase in the number of subjects who have lost >3.6 kg in the last 6 months and a history of reduced food intake <50% of the normal portion. Albumin value <3.0 also increased. The number of subjects with PONS value ≥1 changed from 33.8% to 52.31% after surgery.

Table 4 shows body weight, BMI, and albumin before and after surgery. Overall, all parameters experienced a decrease in average after laparotomy. Table 5 shows a comparison of PONS values before and after surgery. Prior to comparative analysis, the data were tested for normality and an abnormal distribution was found. Therefore, the PONS value data is displayed with a field (range) and a comparison analysis of PONS values is carried out by the Wilcoxon test. The preoperative PONS value was 0 (0-3) and the

postoperative PONS value was 1 (0-3). Comparison test of pre- and post-surgery PONS values showed a significant difference, with a value of p = 0.001 (Table 5).

Table 4. Weight, Body Mass Index, and Albumin Before and After Laparotomy

Parameter	Preoperative	Postoperative
Weight	63.34±11.52	62.54±11.41
body mass index	25.0±3.90	24.26±3.88
Albumin	3.72±0.77	3.39±0.63

Table 5. Comparison of PONS Values Before and After Laparotomy

PUNCH	Median	range	p value
Preoperative	0	0-3	0.001*
Postoperative	1	0-3	

Note: Wilcoxon test, * significant α<0,05

DISCUSSION

Malnutrition is a significant problem faced by some surgical patients and can directly affect or even complicate hospitalization. Regardless of BMI value, hospitalized patients are usually malnourished because of the patient's tendency to reduce food intake due to poor appetite due to underlying disease, gastrointestinal symptoms, reduced ability to chew or swallow or instructions not to take any food orally for food purposes. diagnostic and therapeutic procedures.

This study involved 65 subjects, which based on PONS assessment, 22 (33.85%) subjects had PONS ≥1 pre-operatively and increased to 34 (52.3%) post-operatively. In addition, there was also a significant difference between preoperative PONS scores and postoperative PONS scores (p = 0.001). To the knowledge of the researchers, there have been no studies that have compared perioperative nutrition in laparotomy using the PONS instrument.

The study by Mohil et al assessed the nutritional status of patients undergoing surgery in a developing country. This study involved many nutritional parameters including: body weight, mid-upper arm circumference, mid-arm muscle circumference, creatinine height index, hemoglobin, lymphocytes, and triceps skin fold thickness. All of these parameters showed a significant decrease postoperatively compared to preoperatively in the group of subjects without postoperative albumin elevation.

In this study, an increase in the number of subjects with albumin <3.0 after surgery was observed, which was 9.25%. Albumin is an acute phase protein with a rapid decrease during inflammation. This phenomenon is mainly due to redistribution to the third space and can be observed already in the first few hours after many types of surgical procedures. In addition, the magnitude of the decrease in albumin is directly proportional to the surgical trauma. Surgical trauma (surgery level) is associated with the stress response that occurs.[14]

The pathophysiology of perioperative albumin metabolism remains unclear. It has been suggested that the main reason for the rapid postoperative decrease in albumin is due to capillary leakage induced by the inflammatory response to surgical trauma (sequestration). Other mechanisms that play a role in reducing postoperative albumin are decreased liver production and dilution of serum albumin.[14]

In addition, decreased albumin is also influenced by the type of operation and fluid management. Regarding fluid management, the ERAS guidelines generally recommend goal-directed fluid therapy for the intraoperative phase and minimally postoperative intravenous fluids, but these recommendations must be adapted for each particular type of surgery.

In terms of kinetics, capillary leakage after major surgery was reported to stop after the second postoperative day.In addition, several studies have shown that decreased albumin occurs mainly during surgery and during the first few hours after major abdominal surgery.[15,16] After this rapid decline, serum albumin levels are reported to remain stable for 72 hours.

CONCLUSION

The distribution of women and men in this study was almost even. The majority of subjects were aged 46-65 years (47.70%), had high school education (55.38%), and with the most indications for laparotomy were tumors or malignancies (38.46%). The number of subjects with risk of malnutrition before laparotomy (PONS ≥1) was 33.85%. The number of subjects at risk of malnutrition after laparotomy (PONS ≥1) was 52.31%. Postoperative nutritional status of study subjects decreased compared to preoperatively. Significant changes in PONS scores were observed before and after laparotomy ($p = 0.001$).

DECLARATIONS

Ethics approval and consent to participate. Permission for this study was obtained from the Ethics Committee of Universitas Sumatera Utara.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

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AUTHORS' CONTRIBUTIONS

MHRS collects the data and writes the initial manuscript. ERD provided contribution and revision regarding the data analysis and imaging aspect of the discussion. RH provided contribution and revision regarding the data analysis and clinical aspect of the discussion. All authors read and approved the final manuscript.

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