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Body Mass Index and Length of Hospitalizations after Laparotomy Surgery

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Abstract: Laparotomy is a surgical operation that is rather common in Indonesia and elsewhere. The incidence of complications and mortality associated with laparotomy was also elevated. One explanation is the body mass index, in conjunction with other predisposing variables. Body Mass Index also influences the duration of the wound healing process. The duration of patient hospitalization post-surgery will be influenced by the wound healing process. This study aimed to ascertain the distribution of body mass index and the duration of postoperative hospitalization following laparotomy in the surgical ward of Dr. M. Djamil Hospital, Padang, as well as the correlation between body mass index and extended inpatient stays post-laparotomy in the same surgical ward. The research was observational and analytical. The study samples comprised all post-laparotomy patients from the surgical ward at RSUP Dr. M Djamil Padang, collected between August and December 2015, utilizing direct physical examination. A total of 41 patients met the requirements for the samples. The results were organized into a frequency table. The results indicated that 41 patients had a mean body mass index of 18.73 ± 2.98. Mean Length of Stay: 9.80 ± 4.92. The connection between body mass index and length of stay in post-laparotomy surgery patients is r=-0.232 and p=0.139, indicating a poor correlation between the two variables.

Keywords: *Laparotomy; Body Mass Index; Length of Stay.*

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I. INTRODUCTION

Commonly underestimated, elderly adults' malnutrition has several harmful health effects. 2013 (culebras). Disease complications and hospital stay outcomes are often affected by undernutrition (hinke, 2016). Malnutrition, overconsumption, and imbalanced diets are linked to several chronic health disorders (Hermsen. 2022). Malnutrition in hospital patients is frequent, underdiagnosed, and undertreated. Disease-related malnutrition results from restricted diet, malabsorption, nutritional losses, or metabolic changes. Malnourished patients have widespread physiological alterations that promote morbidity and mortality (Saunders. 2010).

Chronic disease, illness, and death can be modified by nutrition. A balanced diet and good eating habits boost immunity, immunometabolism, and minimize the risk of chronic and infectious diseases. Kamyari et al. 2021. Hospital malnutrition, a common but underdiagnosed issue, affects patient outcomes and health care costs. Timsina et al. (2012). Malnutrition can be caused by insufficient nutritional intake, malabsorption, utilization, or hypercatabolism. Malnutrition has been described in numerous ways in the literature due to its lack of a common definition. Thus, hospitalized individuals have a 16-68% malnutrition rate. (Somanchi et al. 2011)

BMI and health behaviors have also been studied. Food habits, fat consumption, physical activity, sedentary leisure time, and All harmful behaviors were linked to BMI. 2020 (Hsu et al.)

Malnutrition affects most people and has serious implications. Around two-thirds of US individuals are overweight (BMI≥25 kg/m2), with one-third being obese (BMI≥30 kg/m2) (Metcalf, et al. 2017). Healthy behavior includes eating well, exercising, and getting enough sleep. Hsu et al. (2014)

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The Centers for Disease Control and Prevention (CDC) reports that 36.5% of US adults are obese and that $147 billion is spent on obesity-related medical costs annually, so determining whether and how self-monitoring aids weight loss is crucial to population health (Painter, et al. 2017). Thus, different methods to prevent this health issue from childhood are needed. Overweight and obesity have increased in Mexican 5-11-year-olds in the recent two decades. The prevalence rose from 26.9% to 34.8% in national nutrition surveys from 1999 to 2006. The 2012 prevalence was 34.4% (Vilchis-Gil, 2016). Previous research link high BMI to poor prognosis and treatment resistance (dongjin, 2023).

Dietary change is crucial to weight control. Negative balance is essential for weight loss. How to achieve and maintain a negative energy balance by discovering the most practical and practicable weight loss procedures has been debated for decades. 2024 (Abdullah).

Chronic care management is reimbursed by Medicare and Medicaid for patients with 2 or more chronic diseases "expected to last at least 12 months or until the patient dies, or that place the patient at significant risk of death, acute exacerbation/decompensation, or functional decline". Thus, detecting malnutrition may affect hospital reimbursement. 2023 (Besculides)

On the importance of nutrition in strengthening the immune system and establishing resilience against viral and bacterial diseases. The Academy of Nutrition and Dietetics Foundation defines food as medicine as "a reaffirmation that food and nutrition play a role in sustaining health, preventing disease, and as a therapy for those with conditions or in situations responsive to diet changes" (Shankar, 2023).

Surgery involves abdominal incisions for digestive and gynecological procedures (Sjamsuhidayat, et al., 2010). Lapara means pelvis and tomy implies cut. Laparotomy is abdominal surgery to examine organ anomalies (Thomas, 2010). A 2004 study in 56 nations predicted 234 million surgical procedures each year (Weiser, et al., 2008). Laparotomy surgery—elective and emergency—is common. Saint Anna Hospital in the Czech Republic reported 910 elective laparotomies in 1998-1999. Cheng Kung University National Hospital in Taiwan performed 340 elective laparotomies from October 1993 to August 1996 with a 6.8% mortality rate. From July to December 2004, an emergency laparotomy was performed on 83 patients at Dr. Cipto Mangunkusumo Hospital in Jakarta. Nine (10.84%) died and 19 (44.19%) had infection issues (Yuwono, 2013).

Dr. M Djamil Padang General Hospital is a referral hospital for Central and West Sumatra, performing most major procedures. According to the 2009 National Tabulation Data of the Ministry of Health of Indonesia, surgical procedures ranked 11th out of the first 50 illness patterns in Indonesian hospitals with 12.8%, 32% of which were laparotomies. Medical records from Dr. M. Djamil Padang Hospital on January 1, 2012, 743 intestinal and oncology patients had surgery from August to October 2011. Twenty patients received laparotomy surgery at IRNA E (Pavilion Ambun Pagi) for 5 gynecological, 12 digestive, and 3 urological reasons (Fahmi, 2012). Dr. M. Djamil Padang Hospital medical record installation data. In 2010, Medical Records Installation of DR M Djamil Hospital reported 322 laparotomy patients, with 1 (0.3%) experiencing complications and 31 (9.6%) dying. In 2011, 336 patients underwent surgery, with 3 (0.8%) experiencing complications and 37 (11%) dying. In 2012, 312 patients underwent surgery, with 15 (4.8%) experiencing complications and 50 (16%) dying.

Hospital care and services can be measured by length of stay (LOS). Patients stay in the hospital for the number of days after laparotomy surgery until they heal and can go. Islam and Limpo (2001) found that post-operative patients remain 7–30 days, averaging 14 days. Nursiah (2010) found that 74.2% of laparotomy patients stayed seven to 14 days and 25.8% stayed longer than 14 days. Extrinsic and intrinsic variables cause long treatment duration, hospitalization of up to 6 days, 28 (45.2%) of more than 7 days, and 4 (6.4%) died. Of the 388 post-laparotomy patients with good nutrition who had surgery, 96 (29.4%) had a hospitalization of more than 7 days, while 28 (45.2%) malnourished patients had the same. Only 6 (1.8%) died with good nutrition, while 4 (6.4%) died with malnutrition.

II. METHOD

This research is an observational analytical study employing a cross-sectional methodology to describe and analyze the correlation between nutritional status and the duration of hospitalization for post-laparotomy patients at Dr. M. Djamil Padang General Hospital. This research was performed in the surgical department of Dr. M. Djamil Padang General Hospital. The research sample comprises individuals from the population that satisfy the inclusion and exclusion criteria. Sampling was conducted utilizing the entire sampling technique, yielding results with numerous distinct diagnoses. Analysis of data to ascertain the correlation between nutritional condition and duration of hospitalization utilizing the SPSS software.

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III. RESULT

Based on the research that has been conducted, information was obtained regarding the description of the subject's characteristics as follows:

Table 1. Average Age Respondents Study

Age (Years)	Mean ± SD	Minimum	Maximum
Respondent Age	30 ± 21,68	0	72

According to table 1, the data indicates that the average age of respondents is 30 years. The youngest participant is 0 years and 2 months old, whereas the oldest participant is 72 years old.

Table 2. Frequency Distribution of Respondents Based on Gender

Gender	Frequency	Percentage
Woman	17	41,5
Man	24	58,5
Total	41	100

According to table 2, the majority of respondents were male, comprising 24 individuals (58.5%), while female respondents accounted for 17 individuals (41.5%).

Table 3. Frequency Distribution of Nutritional Status by Category

Variable	Category	Frequency	Percentage
Nutritional status	Not enough	19	46,3
	Normal	19	46,3
	More	3	7,4

Table 3 indicates that the distribution of nutritional status is as follows: 19 individuals (46.3%) fall into the category of less, 19 individuals (46.3%) are classified as normal, and 3 individuals (7.4%) are categorized as more.

Table 4. Frequency Distribution of Respondents Based on Body Mass Index

Body Mass Index (Kg/m^2)		
SD Average ±	Minimum	Maximum
18,73 ± 2,98	14,1	26,6

Table 4 indicates that the average Body Mass Index of respondents is 18.73 ± 2.98. The maximum Body Mass Index recorded is 26.6. The minimum Body Mass Index recorded is 14.1. The BMI data exhibits a normal distribution ($p = 0.13$). A normal data distribution is indicated by a p-value greater than 0.05.

Table 5. Frequency Distribution of Length of Stay Based on Category

Variable	Category	Frequency	Percentage
Length of hospitalization	Less (< 10 days)	27	66,0
	Normal (10-14 days)	8	19,0
	More (> 14 days)	6	15,0

Table 5 indicates that the distribution of length of stay is as follows: the less category comprises 27 individuals (66%), the normal category includes 8 individuals (19%), and the more category consists of 6 individuals (15%).

Table 6 Average Frequency Distribution of Respondents Based on Length of Hospitalization

Length of hospitalization		
SD Average ±	Minimum	Maximum
9,80 ± 4,92	4,00	27,00

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Table 6 indicates that the average length of hospitalization for respondents is 9.80 ± 4.92 days, with a minimum stay of 4 days and a maximum of 27 days. The length of hospitalization data exhibits a non-normal distribution (p = 0.033). A normal data distribution is indicated by a p-value of less than 0.05.

A bivariate analysis was performed to examine the relationship between nutritional status and length of hospitalization in post-laparotomy surgery patients, utilizing the Chi-Square Test method.

Table 7. Correlation of BMI with Length of Hospitalization

BMI/ Length of Hospitalization	r	p-value
	0,232	0,139

According to table 7, the correlation between BMI and length of stay demonstrates a weak strength (r = -0.232) and exhibits a negative pattern. The statistical test results indicate a p-value greater than 0.05, suggesting that there is no significant correlation between nutritional status and length of stay (p=0.139). The results of the SPSS analysis indicate that there is an inverse relationship between BMI and length of stay, suggesting that individuals with a BMI closer to the normal range tend to have a shorter length of stay. In contrast, when BMI is either below or above the normal range, the duration of stay will be extended.

IV. DISCUSSION

The study found that the average body mass index of respondents was 18.73 ± 2.98 (see table 5.3). In Algindo, et al (2006) research of 135 post-laparotomy cases, 28 had overnutrition (20%), 72 had normal nutrition (53%), and 35 had malnutrition (27%). Hypermetabolism and catabolism are complex hormonal and sympathetic nervous system responses to surgery and injury (McWhirter & Pennington, 2004). Significant salt and water retention increases basal metabolic rate and hepatic glucose production. Protein synthesis and 80% glucose generation are needed for wound healing. Fat in adipose tissue and protein stores (lean muscle mass) are mobilized for glucose and protein synthesis, causing weight loss. Overall, the catabolic reaction raises energy and protein needs, which vary with surgery time. Recent studies suggest proper consumption can reduce surgery-induced catabolism (Souba & Wilmore, 2004; Green, 2003).

According to Burkitt (2007), the study's results differed because malnutrition in surgical patients can be caused by several factors, including decreased food intake due to clinical conditions before hospitalization (anorexia, fasting, swallowing pain, physical or mental disorders). Second, trauma, sepsis, cancer, and surgery can cause malabsorption and metabolic problems.

Diet and post-operative nutrition are crucial to surgery success and patient recovery. Post-operative wounds and stress demand calories and protein for energy and protein synthesis. According to Meilany, et al. (2012), carbs provide 55–60% of the body's calories. The importance of carbohydrates for wounds as lubricant, transport, immunology, hormone, and enzymatic structural components. Hexokinase enzyme activity and citrate generation in wound healing processes depend on carbohydrates, which are the primary components of glycoproteins. Lactate can also provide energy from carbs. Lactate, a glucose metabolic product, aids wound healing. In addition to providing energy, lactate increases collagen synthesis and activates the healing process. Protein deficiency inhibits acute and longterm wound healing. Dipeptides and polypeptides heal wounds.

The survey revealed a typical average hospitalization duration of 9.00-4.92 days for responders. The inflammation process lasts until the fifth day, then the proliferation process until the third week, when the wound reaches 25% of its tensile strength (Sjamsuhidayat, et al., 2010).

Islam and Limpo (2001) found that post-operative patients remain 7–30 days, averaging 9 days. Nursiah (2010) found that 74.2% of laparotomy patients received treatment for seven to 14 days and 25.8% for more than 14 days. Kusumayanti (2011) found that 4 (21.1%) of respondents had long hospitalization days (>7 days) and 15 (78.9%) had short hospitalization days (1–7 days). In this study, low-healing-rate diseases like appendicitis predominated.

The correlation test demonstrated a poor association between Body Mass Index and hospitalization length, with r = -0.232 and p = 0.139. Categorizing illness type, age, gender, comorbidities, and other predisposing factors may explain the weak association between the two variables. Syahrul Said (2011) found no significant correlation between nutritional status and laparotomy length of stay. Arianto (2007) found no significant association between body mass index and length of hospitalization in post-laparotomy surgery patients. This study's limitations include broad bias related to patient gender, uncategorized age, and comorbidities.

Unlike Dewi (2009), body mass index and length of stay in post-laparotomy surgery patients correlated with r = 0.34. This study had more specific exclusion criteria, such as disease type and age (young, adult, elderly). Mulyadi and Agus (2010) found a strong association between body mass index and hospitalization length in post-laparotomy surgery patients (r = 0.47). In this study, researchers grouped diseases by age, gender, and absorption dysfunction kind. Within 48

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hours of surgery, nutritional status data was collected and observed once. Too little time to take body mass index after surgery may have contributed to a weak connection with hospitalization length.

In addition to individual factors in patients, Daniels (2003) found that lack of awareness, inadequate knowledge and nutrition training for staff, limited availability of multidisciplinary clinical nutrition specialist services and teams, and lack of support for policies, procedures, guidelines, and standard operating procedures contributed to the decline in nutritional status in hospitalized patients. Only 2 participants in this trial received therapy within 3 hours of symptom onset, affecting therapy outcome regardless of distortion. This thrombolytic treatment fails most individuals.

V. CONCLUSION

The study found no significant relationship between nutritional status and the length of hospitalization for patients following laparotomy surgery in the surgical ward of Dr. M Djamil Padang General Hospital.

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