The Relationship of Body Mass Index with Length of Stay in Acute Appendicitis Patients Who Have Undergoing Open Appendectomy at RSUS Lippo Village Karawaci Hospital

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Abstract

Background : Appendicitis is an inflammation that occurs in the veriform appendix. The Indonesian Ministry of Health announced that the number of inpatients with appendicitis is the fourth most common disease in Indonesia. Open appendectomy is a procedure for treating appendicitis. Patients who have an open appendectomy procedure require hospitalization for the wound to heal. Various studies have been conducted to find a relationship between body mass index and length of stay in patients with appendicitis but have different results, besides that research on this topic is still minimal in Indonesia. Therefore, this study was conducted to analyze the relationship between body mass index and length of stay in acute appendicitis patients who had undergone open appendectomy.

Methods : This study used a cross-sectional study design with a sample population of acute appendicitis patients at Lippo Village Hospital Karawaci. 182 samples were selected using a purposive sampling technique. The research sample data was taken from the patient's medical records and will be tested for analysis using SPSS 25 with the Kruskal Wallis ANOVA method.

Result : From 182 research samples, it was found that the median length of stay of patients with different body mass indexes was 3 days. Based on the Kruskal Wallis ANOVA test, there was no significant elationship between gender and length of stay ($p > 0.05$).

Conclusions : This study shows that there is no relationship between body mass index and length of stay in acute appendicitis patients who have undergone open appendectomy.

Introduction

Appendicitis is inflammation that occurs in the vermiform appendix. Appendicitis is most often caused by obstruction of the lumen by faecolith and lymph tissue.[1] The Indonesian Ministry of Health announced that the number of inpatients with appendicitis is the fourth largest disease in Indonesia after dyspepsia, duodenitis and other digestive diseases with 28,949 inpatients and 34,386

outpatients. Additionally, appendicitis was one of the top 10 diseases in hospitalized patients in 2009, with 596,132 cases and at least 234 patient deaths.[2]

BMI is defined as a person's weight (in kilograms) divided by their height (in meters) squared (kg/m2).3 BMI consists of categories: underweight (<18.5 kg/m2), normal (18.5 – 24 .9 kg/m2), overweight (25 – 29.9 kg/m2), obese (>30 kg/m2).[3] Luke Frecelton et al. in his 2018 research at a hospital in South Wales entitled *"Impact of body mass index on utilization of selected hospital resources for four common surgical procedures"* found that 52 patients with obese BMI who underwent a laparoscopic appendectomy procedure had a longer hospital stay. longer (2 – 3.6 days) than in 78 patients with a normal BMI (1 – 2 days). The same thing was also found in patients who had an underweight BMI who had a longer hospital stay (1.4 – 3.6 days). from normal BMI.[4]

Research conducted by Eric Lorio et al. had different results from research conducted by Luke Frecelton.In his research entitled in 2021 with the title *"Appendectomy Hospital Stay: No Difference in Obese Adult or Pediatric Patient Length of Stay Compared to Nonobese Patients".* Eric Lorio studied 118 people adults and 38 children who underwent appendectomy. Patients were grouped into obese and non-obese, with obesity defined as a BMI of 30.0 kg/m2. In adults, there was no significant difference in length of stay between 45 obese and 73 non-obese patients. In children, there was also no significant difference in length of stay between 9 obese patients and 29 non-obese patients.[5]

One of the reasons researchers wanted to conduct this research was the relationship between the patient's length of stay and the costs incurred to care for the patient. Research conducted by Achmad Musa et al. shows that the cost of the length of stay required in one day at RSUD Dr. Moewardi amounting to Rp. 110,000.00. The author hopes that by conducting this research, health workers can estimate the costs needed to treat appendicitis patients who have different body mass indexes, furthermore. The difference in research results in these two studies and the small number of studies conducted in Indonesia on this matter caused the author to want to research this matter.

Material And Methods

This research was 3 groups unpaired numeric comparative analytic study with cross sectional study design, conducted from January 2023 to April 2023. The sample used in this research is 182 post open appendectomy patient with the inclusion of complete patient data in the medical record, namely height, weight, duration of hospitalization and diagnosis of acute appendicitis. Acute appendicitis patients undergoing open appendectomy at

RSUS Lippo Village Karawaci aged 18-60 years. Data was collected using purposive sampling from patient's medical record. Samples who fulfilled the exclusion criteria, namely Patients who have complicated appendicitis, Peritonitis, Patients who have comorbidities such as diabetes, hypertension, anemia, and smoking, etc, were removed from the research. With the classification of research variables in the form of independent variables, which were knowledge about open appendectomy and body mass index, and the dependent variable was length of stay, as well as confounding variables namely age and sex.

Obtained research data was processed and analysed using Statistical Package for the Social Sciences (SPSS) software version 25. Multivariate statistical analysis was performed using Kruskal Wallis when the data distribution was not normal and ANOVA when the data distribution was normal. The researcher also calculated the median, minimal value, maximal value, and 95% CI. Data analysis was then continued with multivariate analysis using the Linear regression test method. The variables used for the linear regression test were Body Mass Index (BMI), age and gender. This research has received approval from the ethical committee of the Faculty of Medicine, University of Pelita Harapan with the number 015/K-LKJ/ETIK/I/2023.

Result

According to table 1, From the 182 subject data processed, the characteristics of the subjects were obtained, consisting of 72 men and 110 women. After calculating the body mass index of the subjects, it was found that 23(12.6%) patients were underweight (BMI <18.5), 85(46.7%) patients had normal/adequate body weight (BMI 18.5 -22, 9), 34 (18.8%) patients were overweight (BMI 23 – 24.9), and 40 (22%) patients were obese based on Asia – Pacific criteria. Based on the data analysis carried out, it was found that the median age of subjects who underwent surgical procedures was 25 years with the youngest being 18 and the oldest being 18 years.

Table 1. Demographic of Samples

Variabel	BMI <18,5(%)	BMI 18,5 - 22,9 (%)	BMI 23 - 24,9 (%)	BMI>25 (%)
Total	23 (12,6%)	85 (46,7%)	34 (18,8%)	40 (22%)
Age				
Median (Min/Max)	22 (18/55)	25 (18/60)	25.5 (18/60)	27.5 (18/60)
Sex				
Male	9 (39,1%)	28 (32,9%)	17 (50%)	18 (45%)
Female	14 (60,9%)	57 (67,1%)	17 (50%)	22 (55%)

Based on the results analyzed using the SPSS program, it was found that the median length of stay in patients who had undergone appendicitis surgery who had a BMI <18.5 was 3 days with a minimum length of stay of 2 days and a maximum of 6 days. Patients who have a BMI of 18.5 – 22.9 have a median length of stay of 3 days with a minimum length of stay of 2 days and

a maximum of 6 days. Patients who have a BMI of 23 – 24.9 have a median length of stay of 3 days with a minimum length of stay of 2 days and a maximum of 6 days. Patients who have a BMI >25 have a median length of stay of 3 days with a minimum length of stay of 2 days and a maximum of 4 days. Tabulation result is shown in table 2.

The results of the Mann – U Whitney test found that the comparison results were not significant between BMI and length of stay (p> 0.05). In the bivariate calculation between age and length of stay, a correlation was found of r = -0.057 and there was no significant comparison between age and length of stay.

In bivariate calculations of the relationship between patient gender and length of stay, it was found that the median value for men - men was 2 days and women was 3 days with the shortest length of stay being 1 day and the longest being 6 days. Based on the p value found after calculations, there was no significant relationship between gender and length of hospitalization.

Table 2. Analysis of Subject Variables on Length of Stay

Variable	n	Median	Min/Max	P Value
BMI* **				
<18,5	23	3	2/6	0.760
18,5 -22,9	85	3	1/6	
23 - 24,9	34	3	1/6	
>25	40	3	1/4	
Age **	r = -0.057		18/60	0.446
Sex*				
Male	72	2	1/6	0.496
Female	110	3	1/6	

Data analysis was then continued with multivariate analysis using the Linear regression test method. The variables used for the linear regression test were Body Mass Index (BMI), age and gender. Based on the results of the confounding test, it shows a coefficient of determination with a value of 0.004. The R2 value explains that the independent variable is able to explain the influence on the duration of hospitalization by 0.4% and the remaining 99.6% is explained by other variables. The final regression model was shown in table 3.

Table 3. Multivariate Analysis of Independent Variable towards Length of Stay

Confounding Variables		No Confounding Variable	P Value
BMI	R square	0,001	0.810
Age	R square	0,003	0.464
Sex	R square	0,003	0.711

Discussion

Based on the results obtained from the research, it was found that the research subjects were dominated by women, totaling 110 people (60.4%). This is in accordance with the epidemiology of appendicitis patients where men suffer from appendicitis 1.4/1 more often than women, but women are more likely to have an appendectomy.

This is also in accordance with the journal conducted by Guss D et al. In this

study it was found that perforated appendicitis was found in 38.7 men and 23.5% of women. This can cause the number of male patients to be less than female because perforated appendicitis is included in the exclusion criteria.

The median length of stay in 182 subjects was 3 days, this is in accordance with the optimal length of stay for patients who have undergone an appendectomy procedure, namely 3 - 5 days. 43 The median age of patients who have had appendicitis is 25 years, this is in accordance with the explanation of Sellar et al. where the most common age for appendicitis is 20 – 30 years old.[1]

The results of the Kruskal Wallis test showed that the comparison results were not significant ($p > 0.05$) between Body Mass Index and the length of stay in patients who underwent open appendectomy surgery. The results of this study are in accordance with research conducted by Lorio E et al. in 2021 which shows that there is no difference in length of stay in obese or non-obese patients. However, my research has different results from research conducted by Marjolijn E. W. Timmerman et al.[5] in 2016 which stated that there was a significant relationship between patients who were obese and patients who were underweight in children.

This difference in results can be explained by the fact that perforations were more often found in children who were underweight, namely 31% when compared to children with normal weight, namely 20%.[6] In a journal conducted by Felix C Blanco et al. It was found that 45% of patients with obese body weight had perforation in appendicitis, while 30% of patients with normal body weight had perforation in appendicitis.[7] Patients who had perforation were included in the exclusion criteria in this study. This can help explain why Body Mass Index did not significantly influence patient length of stay in this study

The results of the Mann-U Whitney test which was carried out to determine the relationship between age and patient length of stay showed that the results were not significant ($p > 0.05$). This is in accordance with the journal conducted by Muhammad Sayuti et al. in Bali in 2022 where age does not significantly influence length of stay. Age can influence length of stay because as age increases, the likelihood of appendicitis perforation increases. In research conducted by Hanson K. A. et al. Patients over [8] years of age are 4 times more likely to suffer from perforated appendicitis.[9] In the elderly group it was also found that elderly women had a shorter hospital stay compared to men due to differences in hormones that can help wound healing. after operation.

Confounding tests were also carried out to determine whether age and gender played a role as confounding factors in this

study. For this reason, multivariate analysis was carried out using the linear regression method. R2 ≥ 10% and delta coef. B ≥ 10% indicates the confounding role of a variable. Because in the results of this confounding test it was found that R2 was <10% and delta coef. B < 10% for these two variables, it is considered that age and gender do not play a role as confounding factors in this study.

There are several shortcomings of this research such as limitations in the research sample resulted in having an abnormal sample in the Kolmogorov – Smirnoff test. Apart from that, there is a lack of factors studied by researchers that can influence the length of stay in patients undergoing open appendectomy surgery.

The obstacles experienced by researchers are the large amount of incomplete data which means researchers cannot have a normal data distribution and the large number of histopathology reports which are not listed in the patient's medical record so researchers cannot classify the type of appendicitis based on anatomical pathology, this research excels with The age limit for the subjects included is the adult age category, namely 18 – 60 years, so that confounding factors regarding age have been minimized.

Apart from that, patients who have complicated appendicitis are also excluded because various studies agree that the severity of appendicitis has a significant effect on the patient's length of stay and can be a confounding factor. 45-47 Different surgical methods are also excluded because the laparoscopic method has been proven to be significant. affecting length of stay, infection at the surgical site and lower pain scores when compared to the appendectomy method. 48 In this study patient comorbidities were also excluded to reduce confounding factors in this study because comorbidities can significantly influence the length of stay in appendicitis patients.

Conclusion

There is no significant relationship (p> 0.05) between body mass index and length of stay in acute appendicitis patients who have undergone open appendectomy at RSUS Lippo Village Karawaci. The median for the length of stay in all body mass index category is 3.

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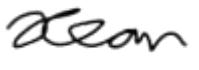

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