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The Relationship Between ASA Physical Status and Body Mass Index (BMI) with Recovery Time of Consciousness in Postoperative Patients Under General Anesthesia at RSUD Cilacap

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Abstract

Recovery of consciousness after general anesthesia is an important aspect of postoperative patient care. Delayed recovery of consciousness can increase the risk of complications, including aspiration, hypoxemia, and hypercarbia. This research aims to analyze the relationship between ASA physical status and IMT with the time to regain consciousness in postoperative patients with general anesthesia at Cilacap Regional Hospital. This research uses a descriptive quantitative method with a correlation analysis design. The research sample consisted of 127 patients post-general anesthesia who were in the recovery room at Cilacap Regional Hospital, selected using the Taro Yamane formula. Primary data were obtained through direct observation and interviews, while secondary data were taken from patient medical records. Data analysis was performed using univariate and bivariate tests using the Chi-Square test. The results showed that most patients (63.8%) recovered consciousness within ≤15 minutes, while 36.2% experienced a delayed recovery (>15 minutes). Bivariate analysis showed a significant relationship between ASA physical status and time to conscious recovery (p=0.00; contingency coefficient 0.426), as well as BMI and time to conscious recovery (p=0.00; contingency coefficient 0.464). Patients with higher ASA status and abnormal BMI tend to have a longer recovery time. The findings implicate the importance of pre-anesthesia evaluation based on ASA status and BMI to predict and mitigate the risk of delayed post-anesthesia recovery of consciousness. This research can be the basis for developing more specific clinical guidelines in the selection of anesthesia techniques and postoperative monitoring to improve the quality of health care.

Keywords: ASA physical status, BMI, recovery time, general anesthesia, postoperative care.

INTRODUCTION

Surgery is an invasive medical procedure that aims to diagnose or treat disease conditions, injuries, or deformities. It can cause damage to tissues and affect the function of other organs (Azmi et al., 2019). Surgery is a medical procedure that utilizes invasive techniques to access tissue, which requires suppression of consciousness and relief of pain; this state is known as anesthesia (Azmi et al., 2019). Every surgical procedure is inseparable from the act of anesthesia (Olfah et al., 2019).

Anesthesia is a condition in which pain is centrally relieved, accompanied by loss of consciousness, through the use of drugs such as amnestics, sedatives, analgesics, muscle relaxants, or a combination of several types of drugs. This condition is temporary, and the patient will regain consciousness after the effects of the drugs wear off (Ministry of Health,

2015). General anesthesia is the technique most often chosen for surgery because it serves as a method of pain relief during surgery, accompanied by the loss of consciousness of the patient (Ida Mardalena, 2020).

Recovery of consciousness after general anesthesia can be defined as a condition of the body in which neuromuscular function, airway protective reflexes, and consciousness have fully recovered after the cessation of anesthetic drug administration and the completion of the surgical process (Risdayati et al., 2021). After the surgical procedure is complete, it is expected that the patient can recover consciousness quickly and without complications. According to (Agustriliani et al., 2023a), anesthesia personnel in the recovery room need to monitor patients for at least 15 minutes before being transferred to the treatment room. Within that time, about 90% of patients will regain consciousness from the effects of anesthesia. If, within 15 minutes, the patient has not recovered or has not regained consciousness, this is considered a delay in recovery of consciousness. Some patients may only respond to stimuli within 30-45 minutes after discontinuation of the anesthetic agent (Agustriliani et al., 2023a).

A prospective research involving 18,000 patients in the recovery room reported that 24% of them experienced anesthesia-related complications (Azmi et al., 2019). Delay in the recovery of consciousness is not an uncommon complication of anesthesia, and it is often a challenge for clinicians to precisely diagnose the underlying cause so that appropriate therapy can be promptly prescribed (Cascella et al., 2020).

Obstructed recovery of consciousness is one of the undesirable events in anesthesia. It is caused by various factors, which include patient factors, problems that arise during surgery and anesthesia, and drug factors. Causes related to anesthesia can be categorized into pharmacological and nonpharmacological factors. Drug factors, for example, involve the use of various anesthetic drugs along with adjuvant drugs that have synergistic properties and may interact. Nonpharmacological factors include conditions such as hypothermia, hypotension, hypoxia, and hypercapnia. In addition, factors related to pharmacokinetics, pharmacodynamics, context-sensitive half-life, number of drugs administered, and interactions between drugs also contribute. Patient factors, such as advanced age, Gender, obesity, genetic factors, and comorbidities (such as cardiac, renal, and hepatic organ dysfunction), may increase the potential effects of the anesthetic drugs administered. Meanwhile, causative factors related to surgery include the duration of surgery and anesthesia techniques used (Permatasari et al., 2017).

According to (Razak et al., 2022) ASA (American Society of Anesthesiologists), pre-anesthesia physical status assessment is very important for anesthesiologists, including nurse anesthetists. Where pre-anesthesia evaluation is the first step to reduce the risk of complications, with the aim of assessing pre-operative physical condition, analyzing the type of surgery, determining the appropriate type and technique of anesthesia, predicting possible complications, and preparing anesthetic drugs and equipment.

During recovery from anesthesia, complications such as airway obstruction, chills, agitation, delirium, pain, nausea, and vomiting may occur. If symptoms and clinical manifestations are not controlled, the effects of anesthesia and slow recovery can cause neurological damage if diagnosis is made late (Agustriliani et al., 2023a). In addition, this

condition increases the risk of aspiration, hypoxemia, and hypercapnia and increases mortality and morbidity (Permatasari et al., 2017).

Body Mass Index (BMI) is a tool used to assess nutritional status in adults based on body weight. This index calculates the ratio between a person's height and weight and is applied to adults aged 18 years and above (Azmi et al., 2019).

In Indonesia, 13.5% of adults aged 18 years and older are overweight, while 28.7% are obese with a Body Mass Index (BMI) above 25. In addition, between 2015 and 2019, 15.4% of adults using RPJMN indicators are obese with a BMI above 27 (MOH, 2021).

Body Mass Index (BMI) reflects the accumulation of excess fat in the body, which can slow down metabolism in individuals with high BMI. The higher a person's BMI, the more body fat they have, so fat-soluble anesthetic drugs will have a stronger effect. This can cause the recovery time of consciousness to be longer (Widiasih et al, 2023)

Based on the results of a preliminary research conducted at Cilacap Regional Hospital, it was found that from the monthly report in the Central Surgical Installation, the number of patients undergoing surgery with general anesthesia during May-October 2024 was 1,127 patients. With the results that have been presented, it can be concluded that there are quite a lot of patients who undergo surgery with general anesthesia. The larger the population, the more diverse the characteristics of the patients observed. That way, delayed recovery of consciousness or prolonged recovery after surgery can occur. Problems related to patient recovery time are a major concern for anesthesiologists, especially in post-surgery with general anesthesia.

Based on the background description above, the purpose of this research is to determine and analyze the relationship between ASA physical status and body mass index on time to recover consciousness in postoperative patients with general anesthesia. The benefit of this research is to provide scientific information that can be used by medical personnel, especially anesthesiologists, to improve the quality of postoperative services; this research is also expected to provide more specific guidelines related to pre-anesthesia evaluation and postoperative monitoring based on ASA physical status and Body Mass Index (BMI).

METHOD

This research employs a quantitative descriptive research design to analyze the relationship between ASA Physical Status and Body Mass Index (BMI) with the time required to regain consciousness in postoperative patients under general anesthesia at RSUD (*Rumah Sakit Umum Daerah*) Cilacap. The population in this research consists of patients who underwent general anesthesia and were in the recovery room at RSUD Cilacap. The number of patients undergoing general anesthesia procedures was obtained from hospital records, totaling 187 patients per month. To determine the sample size, the Taro Yamane formula was used, yielding 127 respondents who were selected using a purposive sampling technique. Inclusion criteria consisted of patients aged ≥18 years, undergoing general anesthesia, and having complete medical records. Exclusion criteria included patients with incomplete data, those undergoing regional anesthesia, and patients with neurological conditions affecting recovery time.

This research utilizes both primary and secondary data. Primary data was obtained through direct observation and interviews with patients and healthcare providers in the recovery room, while secondary data was extracted from medical records, including ASA Physical Status, BMI, and documented recovery time post-anesthesia. The collected data were processed using editing, coding, tabulation, and cleaning techniques. Statistical analysis included univariate analysis (descriptive statistics for all variables), bivariate analysis (Chi-Square test for relationships between variables), and the Contingency Coefficient Test to measure the strength of categorical variable relationships.

To ensure reliability and validity, the research adhered to strict research criteria. Ethical approval was obtained from the RSUD Cilacap ethics committee, and informed consent was acquired from participants. Standardized measurement protocols were followed for ASA classification, BMI calculation, and recovery time assessment, ensuring compliance with hospital guidelines and international standards. Patient confidentiality was maintained through anonymization in accordance with ethical research practices. These measures enhance the credibility of the findings and ensure the research meets scientific rigor.

RESULT AND DISCUSSION

Univariate Analysis

This research describes five categories of variables, namely, age, gender, anesthesia technique, ASA physical status, body mass index (BMI) and recovery time, which are presented in the form of frequency distribution.

Table 1. Frequency Distribution of Respondent Characteristics Based on Age (n=127)

Characteristics	Frequency (n)	Percentage (%)
Age (year)		
Adults (19-44)	44	34.6
Pre-elderly (45-59)	54	42.6
Elderly (≥60)	29	22.8
Total	127	100

Table 1 shows that of the 127 respondents involved in this research, the Pre-elderly age group (45-59 years) included 54 people, with the largest proportion of 42.6%.

Table 2. Frequency Distribution of Respondents' Characteristics By Gender (n= 127)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	50	39.4
Female	77	60.6
Total	127	100

Table 2 shows that out of a total of 127 respondents, 77 people (60.6%) were female. This indicates that most of the respondents in this research were female.

Table 3. Frequency Distribution of Respondent Characteristics Based on Anesthesia Technique (n=127)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Tiva	70	55.1
Inhalation	57	44.9
Total	127	100

Table 3 shows that out of 127 respondents, 70 people (55.1%) used the Total Intravenous Anesthesia (TIVA) anesthesia technique, and the majority of respondents in this research were given anesthesia with the TIVA technique.

Table 4. Frequency Distribution of Characteristics Respondents Based on ASA Physical Status (n=127)

Characteristics	Frequency (n)	Percentage (%)
ASA Physical Status		
ASA I	1	0.8
ASA II	95	74.8
ASA III	31	24.4
Total	127	100

Table 4, shows that of the total 127 respondents, most respondents, 95 people (74.8%), had ASA II status, indicating patients with mild systemic disease.

Table 5. Frequency Distribution of Characteristics of Respondents Based on Body Mass Index (n=127)

Characteristics	Frequency (n)	Percentage (%)
Body Mass Index (BMI)		
Underweight (< 18.5)	5	3.9
Normal Weight (18.5-22.9)	88	69.3
Overweight (23-24.9)	21	16.5
Obesity I (25-29.9)	11	8.7
Obesity II (≥30)	2	1.6
Total	127	100

Based on Table 5, it is known that most of the respondents, 88 people (69.3%), have a BMI in the normal weight category (18.5-22.9).

Table 6. Frequency Distribution of Respondents' Characteristics Based on Recovery Time (n=127)

Characteristics	Frequency (n)	Percentage (%)
Consciousness Recovery Time		
≤ 15 minutes	81	63.8
≥ 15 minutes	46	36.2
Total	127	100

Based on the table, it is known that most respondents experienced a recovery time of less than ≤ 15 minutes (relatively short), which includes around 63.8% or 81 people from the total respondents.

Bivariate Analysis

In this research, using the Chi-Square test, this test is a non-parametric test to determine the significance of the hypothesis when each variable is associated. As shown in Table 7 as follows:

Table 7. Results of Bivariate Analysis of the Relationship between ASA Physical Status and Time to Recover Consciousness in Postoperative Patients with General Anesthesia

Variables	Time to regain consciousness				P Value	Contingency Coefficient
	≤ 15 minutes		≥ 15 minutes			
ASA Physical Status	f	%	f	%	P = 0.00	0.426
ASA I	0	0	1	0.8		
ASA II	73	57.4	22	17.3		
ASA III	8	6.3	23	18.1		
Total	81	63.8	46	36.2	127	

Source: Chi-Square test data 2024

Based on Table 7, after the data analysis test using the Chi-Square test, it was found that between the American Society of Anesthesiologist (ASA) Physical Status variable and the recovery time showed that the p-value of 0.00 was smaller than the value of 0.05 it could be stated that there was a relationship between ASA physical status and the recovery time of post-general anesthesia patients. The level of closeness of the relationship between ASA physical status and time to recover consciousness in patients after general anesthesia can be seen from the Contingency Coefficients value of 0.426, which means that the level of closeness of the relationship is moderate, namely in the range (0.40-0.59). The greater the C value, the higher the closeness of the relationship, and vice versa.

Table 8. Bivariate Analysis of the Relationship between Body Mass Index (BMI) and Time to Recover Consciousness in Postoperative Patients with General Anesthesia

Variables	Recovery Time				P Value	Contingency Coefficient
	15 minutes		15 minutes			
Body Mass Index (BMI)	f	%	f	%	P = 0.00	0.464
<18.5 (Underweight)	4	3.2	1	0.8		
18.5-22.9 (Normal body weight)	69	54,3	19	14,9		
23-24.9 (Overweight)	7	5,5	14	11		
25-29.9 (Obesity 1)	1	0.8	10	7.8		
≥30 (Obesity II)	0	0	2	1.6		
Total	81	63.8	46	36.2	127	

Source: Chi-Square test data 2024

Based on Table 8, after the data analysis test using the Chi-Square test, it was found that the p-value of 0.00 was smaller than the value of 0.05, so it could be stated that there was a relationship between Body Mass Index and the recovery time of post-general anesthesia patients. The level of closeness of the relationship between BMI and time to recover consciousness in patients after general anesthesia can be seen from the Contingency coefficient value of 0.464, which means that the level of closeness of the relationship is moderate, namely in the range (0.40-0.59).

Demographic Data of Respondents and Anesthesia Techniques Used

The results of the analysis on the age of respondents who will perform surgery under general anesthesia at the Cilacap Regional General Hospital show that most respondents belong to the age group 45-59 years, which includes 42.6% of the total respondents. Meanwhile, with regard to the time to recover consciousness, it showed that most respondents recovered within less than 15 minutes (relatively fast), which included around 63.8% or 81 people of the total respondents. These two data may provide insight into how age may affect the recovery time after surgery. Patients from older age groups, such as the elderly, may face longer recovery times due to various age-related factors, such as decreased physical function and slower metabolism, which may affect the body's response to anesthesia and the postoperative recovery process. In contrast, adults and pre-elderly groups, who tend to be in better physical condition, may experience faster recovery.

However, although the 45-59 years age group was the largest age group in this research, the fact is that most patients recovered in a relatively short time (≤15 minutes). This suggests that the variation in recovery time may be influenced by other factors such as physical status, type of anesthesia, and procedure duration that could affect the recovery time of each age group. The inconsistency between the data of the majority of respondents by age group and the recovery time is the basis for the assumption that the relationship between recovery time and physical status or comorbidities that may be related to age is also important to consider.

Previous research explains that age is a factor that affects the time to recover consciousness because in elderly patients, sensitivity to anesthetic drugs, including opioids and benzodiazepines, tends to increase due to decreased central nervous function; this can be caused by excessive dosing and decreased drug metabolism in elderly patients, which contributes to the emergence of residual drug effects (Permatasari et al., 2017). In a research, (Tsai et al., 2011) also explained that age with ROC (Recovery of Consciousness) time, where older patients have a slower ROC. It was explained that during the aging process, the anatomical and functional areas of the brain that participate in consciousness change progressively. Changes in pharmacokinetic properties and response to anesthesia in the geriatric population also play a role. The volume of distribution, clearance rate, and plasma protein binding decrease, resulting in increased plasma concentrations of free drug. Furthermore, compared to young people, the concentration required to achieve the same depth of anesthesia, whether intravenous or inhalation anesthesia, decreases in elderly patients.

Furthermore, the data also showed that female respondents made up the majority of the respondents in this research, accounting for 77 people (60.6%). The data also explained that the recovery time showed that most respondents experienced a recovery time of less than 15 minutes (relatively fast), which accounted for about 63.8% of the total respondents. In other words, more than half of the respondents experienced a faster recovery time. Although this gender distribution is quite varied, it is not known by statistical analysis whether Gender plays a role in patients' conscious recovery time. However, since the proportion of females was greater in this research, it was assumed that

there might be a difference in conscious recovery time between the higher genders, although it was not explained in the facts presented.

There is evidence that women and men have different responses to anesthesia or postoperative recovery, which may be influenced by different physiological or hormonal factors between the two (Risdayati et al., 2021). Also, in theory, gender differences can affect how the body processes anesthesia, where women sometimes have a different metabolism (Wahyuni et al., 2023). In addition, most respondents experienced a shorter recovery time, so the effect of Gender on the time to regain consciousness in this research cannot be clearly concluded without further analysis.

Another research also mentioned that women tend to have more fat tissue (Dmitruk, 2018), which can affect the distribution of anesthetics in the body. Anesthetics, which are usually fat-soluble, will tend to collect in larger fat tissue. This fat tissue serves as a reservoir that can store anesthetics longer, thus extending the duration of the anesthetic effect (Tsai et al., 2011). As a result, individuals with a higher percentage of body fat may require a higher dose or longer time for recovery from anesthesia, as the drug is distributed and released more slowly into the blood circulation. This may also affect the metabolism of the drug and prolong the time it takes to reach an effective concentration in the body.

The research found that the majority of respondents (70 people or 55.1%) used Total Intravenous Anesthesia (TIVA) anesthesia techniques, while 57 people (44.9%) used inhalation anesthesia techniques. Regarding the recovery time, it showed that most respondents (around 63.8%) needed a relatively fast recovery time, which was less than or equal to 15 minutes. The higher proportion of patients with TIVA anesthesia technique and accompanied by a recovery time of less than or equal to 15 minutes is the basis for the researcher's assumption that anesthesia technique may affect the patient's conscious recovery process because these two techniques have differences in how they work and their effects on the body.

TIVA uses intravenous medications to provide continuous anesthesia, while inhalation anesthesia uses gas to render the patient unconscious during the procedure (Casas-Arroyave, 2022). In other words, TIVA essentially tends to provide faster recovery as it does not rely on the lasting effects of anesthetic gas in the body (Xu et al., 2017). As described in the literature, post-anesthetic recovery can be delayed if anesthetic gases with high solubility in the blood or intravenous anesthetic drugs with a long duration of action are used (Shui et al., 2021). The lower the solubility of the inhaled anesthetic drug in the blood, the faster the elimination process of the drug. However, the sensitivity of the central nervous system to CO2 decreases as a result of opioid administration, which can lead to respiratory depression and hypercapnia. This condition can potentially hinder the elimination of inhaled anesthetic gas. In addition, administration of excessive doses of muscle-paralyzing drugs or residual effects of such drugs can resemble decreased consciousness, characterized by the absence of response to pain stimuli (Tuti Hartini, 2024). In other words, this research, where more patients used TIVA (which should be faster in providing conscious recovery), also provides specific information linking this anesthetic technique with the time to conscious recovery in this research.

While most respondents recovered in less than 15 minutes, there were variations in the recovery time, suggesting other factors influencing recovery. For example, some respondents took longer to recover (≥15 minutes). This could be due to individual differences in metabolism, the use of additional medications during the procedure, or factors related to the patient's physical status. Given the almost equal proportion between the use of TIVA and inhalation anesthesia, it cannot be directly concluded that either technique leads to faster or slower recovery time.

ASA Physical Status (American Society of Anesthesiologists) is a classification system used to assess the physical condition of patients before undergoing anesthesia and surgical procedures (Suyuthi & Agung, 2024). In Table 4, the distribution of respondents based on ASA physical status shows that the majority of respondents in this research were in the ASA II category, with a total of 95 people (74.8%). There was only 1 respondent (0.8%) who fell into the ASA I category in this research, i.e., patients who were completely healthy without medical disorders. This shows that most of the patients in this research had quite complex medical conditions and required extra consideration in terms of anesthesia and recovery.

Overall, this distribution of ASA physical status gives an idea of the group of patients who are more at risk and require special attention in the anesthesia process, with most patients in the ASA II and III categories. It may also indicate the potential for longer recovery times, as more serious medical conditions may slow down the recovery process from the effects of anesthesia. Therefore, this ASA physical status is one of the important factors in determining the type of anesthesia to be administered to patients undergoing surgery. This factor plays a role in supporting the recovery of the patient's vital functions to their original condition before undergoing surgery and anesthesia. Based on the theory of the American Society of Anesthesiologists (ASA), assessing pre-anesthetic physical status is very important for anesthesiologists. This assessment is the basis for choosing the appropriate anesthesia technique, not only based on the size of the surgery but also considering the patient's overall physical condition (Iqbal, 2024).

Body Mass Index (BMI) is a practical method for assessing the nutritional status of adults, particularly in identifying underweight or overweight. In other words, the Body Mass Index (BMI) provides an indication of whether a person has a normal weight, less, more, or obesity. In this research, the body mass index (BMI) was seen through the pre-anesthesia observation sheet in the patient's medical record. Then entered into the formula to determine Body Mass Index (BMI). According to WHO, IMT is divided into 5 categories, namely Underweight: <18.5 kg/m^2, Normal: 18.5-22.9 kg/m2; Overweight; 23-24.9 kg/m2, Obesity I: 25-29.9 kg/m2, Obesity II: ≥30 kg/m2.

Based on table 5, it shows that the majority of respondents in this research had normal body weight, with a total of 88 people (69.3%) in the BMI range of 18.5-22.9. This indicates that most of the patients in this research were in a healthy or ideal weight condition, which has a lower risk of complications related to anesthesia and recovery after surgery.

The data indicates that the majority of respondents in this research were in the healthy (normal) weight category. This body mass index is basically a multifactor

condition caused by various other aspects that affect it. According previous research, with age, there is a natural decrease in muscle mass, while fat mass tends to increase, especially in the abdominal area. This condition can cause an increase in Body Mass Index (BMI).

The age factor that affects body mass index, there is also the factor of physical activity; if this inactivity continues, it can be one of the factors causing an increase in Body Mass Index (BMI) (Maudyanti et al., 2022). (Harahap et al., 2020) said that diet is influenced by several factors, such as eating habits, frequency of eating, and types of food consumed. If food intake exceeds nutritional needs, while physical activity is inadequate, this can cause excessive fat accumulation and lead to obesity.

Recovery of consciousness is a condition in which the airway-protective neuromuscular reflexes and consciousness of the patient have fully recovered after the cessation of anesthetic drugs. This time refers to the interval between the completion of the surgical procedure and when the patient is fully awake and able to respond normally to stimuli, such as opening eyes, speaking, or moving. This process is important to ensure that patients can regain control of their body functions, especially in maintaining airway patency independently after anesthesia (Rosadi et al., 2022). A fast recovery time is often considered an indication of a good recovery time, while a slower recovery time may indicate a problem or complication that needs attention. About 90% of patients will regain consciousness from anesthesia within 15 minutes. However, if consciousness is not restored within 15 minutes, this is categorized as delayed recovery. Some patients even take 30-45 minutes to respond to stimuli after discontinuation of the anesthetic agent (Agustriliani et al., 2023a).

Table 6 shows that most of the respondents experienced a recovery time of less than 15 minutes (relatively short), which includes about 63.8% or 81 people from the total respondents. This indicates that patients in this research recovered from anesthesia in a relatively short time, which is usually considered a reasonable or rapid recovery after general anesthesia.

However, although many patients recovered in a short time, there were patients who experienced a delayed recovery time of ≥15 minutes. Respondents who experienced delayed recovery time showed that postoperative complications prolonging the recovery time in the Cilacap Regional General Hospital still occurred with a total of 46 out of 127 respondents or around (36.2%), which is in line with research conducted by (Aini, 2019), which states that of 456 samples, there were 96 cases of delayed recovery, which is equivalent to around 21%. In addition, delays in recovering consciousness in elderly patients reached an incidence of 65% of the total general anesthesia actions. A prospective research involving 18,000 patients in the recovery room showed that 24% of them experienced post-anesthesia complications. One of the most common complications is delayed recovery time (Misal et al., 2016).

Relationship Between American Society of Anesthesiologists (ASA) Physical Status and Recovery Time After General Anesthesia

The results of this research found that between the American Society of Anesthesiologists (ASA) Physical Status variable and the recovery time showed that the *p-value* of 0.00 was smaller than the value of 0.05 so that it could be stated that there was

a relationship between ASA physical status and the recovery time of post-general anesthesia patients. The level of closeness of the relationship between ASA physical status and time to recover consciousness in patients after general anesthesia can be seen from the Contingency Coefficients value of 0.426, which means that the level of closeness of the relationship is moderate, namely in the range (0.40-0.59).

The proof of this hypothesis indicates the similarity of the results with the findings of previous research, research by (Nur Azizah et al., 2022), which shows the relationship between ASA physical status and time to recover consciousness after general anesthesia. The average patient recovery time varies based on ASA status, which is 13 minutes for ASA I, 24 minutes for ASA II, and 34 minutes 44 seconds for ASA III.

This research is also supported by research (Sommeng, 2019), which states that there are significant differences in conscious recovery time between patients with ASA 1, ASA II, and ASA III status. The higher the patient's ASA physical status, the more severe the systemic disorders experienced by the patient. This condition causes the body's organs to respond more slowly to drugs or anesthetic agents, which results in a longer recovery time. The relationship between ASA physical status and recovery time is also shown by research (Agustriliani et al., 2023), which shows that there are differences in recovery time between ASA I, ASA II, and ASA III. Respondents with ASA 1 of 18 respondents who had normal recovery times were 17 respondents (37.0%) and 1 respondent (2.2%) experienced delays, ASA 2 of 22 respondents who had normal recovery times were 3 respondents (6.5%) and 19 respondents (41.3%) experienced delays, and ASA 3 of 6 respondents who had normal recovery times were absent and 6 respondents (13.0%) experienced delays. Another research was also conducted by Pohan et al. (2021), which aims to determine how the recovery time of general anesthesia patients with ASA I and ASA II in the conscious recovery room is described. Of the 40 patients, 34 patients (87.5%) recovered from anesthesia within 30 minutes, and 6 patients (15%) recovered from anesthesia in more than 30 minutes. Patients with a recovery time of more than 30 minutes consisted of 2 patients (5%) with ASA I and 4 patients (10) with ASA II. The results of this research illustrate that patients with ASA I can recover faster than patients with ASA II, and delayed recovery time does not occur in patients with ASA I and ASA II at Dustira Cimahi Hospital.

Generally, the mechanism by which ASA physical status influences the recovery time is through several factors related to the physical condition and function of the patient's organs. Patients with lower ASA status (ASA I or ASA II) have better physical conditions, where organs such as the heart, lungs, and kidneys function optimally. This good organ function allows the metabolism and elimination of anesthetic drugs to take place more efficiently so that anesthetic drugs such as inhalation agents or sedatives are more quickly removed from the body. As a result, patients with a healthier ASA status will have a faster recovery time, as their bodies are better able to cope with the residual effects of anesthesia more quickly and effectively. In addition, good blood circulation also ensures a more efficient supply of oxygen to the brain, supporting the recovery of cognitive function and consciousness.

Conversely, in patients with higher ASA status (e.g., ASA III or ASA IV), poorer physical conditions such as the presence of heart disease, respiratory distress, or uncontrolled diabetes may slow down the recovery process. These diseases may interfere with blood circulation, metabolism, or the body's ability to eliminate anesthetic drugs, causing the effects of the drugs to last longer. Patients with heart or lung disorders experience reduced blood flow or adequate oxygenation, resulting in a longer recovery of consciousness. In addition, impaired kidney function can also slow down the elimination of anesthetic drugs, which in turn prolongs the recovery time. Therefore, underlying medical conditions can alter the body's response to anesthesia and prolong the duration of recovery of consciousness. This is in accordance with the statement put forward by Tuti Hartini (2024), which states that this occurs because the high physical status of patients/ASA who have a history of comorbidities has decreased metabolism and secretion of anesthetic drugs, which results in slow recovery time.

Relationship Between Body Mass Index (BMI) and Recovery Time After General Anesthesia

After analyzing the data, the results found between the variables of Body Mass Index and time to recover consciousness show that the *p-value* of 0.00 is smaller than the value of 0.05, so it can be stated that there is a relationship between Body Mass Index and time to recover consciousness in patients after general anesthesia. The level of closeness of the relationship between BMI and time to recover consciousness in patients after general anesthesia can be seen from the Contingency coefficient value of 0.464, which means that the level of closeness of the relationship is moderate, namely in the range (0.40-0.59).

This research is supported by (Widiasih et al., 2023), which shows that there is a relationship between body mass index and time to recover consciousness in postoperative general anesthesia patients at the Sanglah Hospital Central Surgical Installation with a p-value = 0.013 ($p < 0.05$). This research is also supported by (Azmi et al., 2019), who show that body mass index and type of surgery with the time to recover consciousness of respondents, a small proportion (10.8%), namely 4 people, experienced delays in recovering consciousness with a significant value of 0.000 and 0.020, which means that there is a relationship between body mass index and type of surgery with time to recover consciousness in postoperative patients with general anesthesia in the Recovery Room of Bangil Hospital.

Another research stated that the time to regain consciousness depends on the metabolism of different anesthetic drugs, in which anesthetic agents are distributed from the blood and brain to muscle and fat tissues. A person with a slow metabolism due to a high amount of fat tissue tends to experience obstacles in the process of eliminating residual anesthetic drugs (Azmi et al., 2019). The length of time it takes for patients to recover consciousness after anesthesia varies and can be influenced by the type and dose of anesthetic drugs used, where the dose determines the duration of the anesthetic effect (Widiasih et al., 2023). The longer the duration of anesthesia, the more anesthetic drugs are deposited in the patient's body, so the body requires more effort to eliminate the remnants of the drug. Anesthetic drugs work by paralyzing all body muscles except the heart. If anesthetic drugs are not eliminated immediately, the body muscles remain in a

paralyzed state, which results in patients taking longer to recover consciousness from general anesthesia (Azmi et al., 2019). In addition, research conducted by (Olfah et al., 2019) also found a relationship between Body Mass Index and time to recover consciousness in children after general anesthesia at Kebumen Hospital, Central Java. The research showed that the Body Mass Index in children with general anesthesia was mostly Ideal, namely 56.8%, with most of the time recovering consciousness quickly, namely 54.5%.

The mechanism underlying these findings may be explained through physiological factors associated with obesity or overweight. Patients with higher BMI have more fat tissue, which affects the distribution of anesthetic drugs in the body. Fat has the capacity to store more anesthetic, which results in a delay in the metabolism and elimination of the drug from the body. As a result, patients with higher BMI tend to take longer to fully wake up from anesthesia. This is in accordance with (Rizkiana et al., 2022), which states that a person's metabolism varies, one of which is influenced by body size, namely height and weight, which is assessed by body mass index. An obese person has larger fat reserves, which means they rarely burn calories. This affects the distribution of anesthetic agents carried from the blood to the brain in muscle and fat. Due to larger body proportions, fat tissue storage is also greater, which can slow down the elimination process of residual anesthetic drugs. In addition, disturbances in organ functions such as breathing and circulation that often occur in overweight or obese patients can slow down the recovery process, prolong the effects of anesthesia, and increase conscious recovery time.

CONCLUSION

The conclusion of this research showed that in terms of ASA physical status, the majority of patients had ASA II status (74.8%), while 24.4% had ASA III, and only 0.8% were at ASA I. The majority of respondents had normal BMI (69.3%), while 16.5% were overweight, 8.7% were class I obese, and 3.9% and 1.6% were underweight and class II obese. Most patients (63.8%) recovered within ≤15 minutes, while 36.2% had a longer recovery, with ASA and BMI factors playing an important role in the duration of recovery. This research found a significant association between ASA and BMI physical status with recovery time of consciousness after general anesthesia, with a moderate level of association (contingency coefficient ASA: 0.426; BMI: 0.464). These results confirmed that the higher the ASA level and the more abnormal the BMI, the longer the patient's recovery time. The implications of this research include the importance of pre-anesthetic evaluation based on ASA and BMI in anesthetic planning and postoperative monitoring to minimize the risk of delayed recovery. The contribution of this research can be the basis for the development of more specific clinical guidelines and further research on other factors that contribute to the duration of consciousness recovery after general anesthesia.

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