

## Analysis of Factors Affecting The Body Temperature of Postoperative Patients At RSUP Dr. M Djamil Padang

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### ABSTRACT

**Introduction:** Surgery is a medical procedure carried out using invasive methods by opening, cutting or slashing parts of the body to provide treatment to the patient. Changes in body temperature can occur in post-operative patients which are influenced by age, gender, body mass index (BMI), duration of surgery, and type of surgery. **Objective:** To analyze the factors that influence the body temperature of post-operative patients at RSUP Dr. M. Djamil Padang. **Methods:** This study is a correlative analytical research using cross sectional design. This study was conducted using primary data and the samples were selected by consecutive sampling technique with a total of 56 samples. **Results:** The results of this study show that there is a relationship between age with body temperature of the patients after surgery ( $p=0,021$ ,  $r=-0,308$ ), there is no relationship between gender with body temperature of the patients after surgery ( $p=0,876$ ,  $r=0,021$ ), there is a relationship between BMI with body temperature of the patients after surgery ( $p=0,033$ ,  $r=0,140$ ), there is a relationship between duration of surgery with body temperature of the patients after surgery ( $p=0,027$ ,  $r=-0,482$ ), and there is no relationship between type of surgery with body temperature of the patients after surgery ( $p=0,762$ ,  $r=0,041$ ). **Conclusion:** There is a significant relationship between age, BMI and duration of surgery with body temperature of the patient's after surgery and there was no significant relationship between gender and type of surgery with body temperature of the patient's after surgery.

**Keywords:** age, gender, BMI, duration of surgery, type of surgery, body temperature

### INTRODUCTION

Surgery or surgery is an invasive medical treatment carried out by opening or displaying the body part to be handled which can cause physiological changes in the body and affect other organs (Tang et al., 2024).

The operation is performed using anesthesia. Anesthesia is a medical action given to relieve feelings or sensations in the body that function so that patients do not feel aches and pains during surgery (Patel et al., 2024).

The human body is able to control temperature in hot and cold environments through the temperature control reflex that the hypothalamus has under normal circumstances (Kusuma,

2024). The action of anesthesia can eliminate adaptation mechanisms and disrupt physiological mechanisms of thermoregulation function (Kim et al., 2024).

The combination of thermoregulation disturbances due to anesthesia and low ambient temperature will result in postoperative hypothermia (Shin et al., 2024). Postoperative hypothermia can cause shock, chills, cardiac dysrhythmia, slow postoperative wound healing, and interfere with patient comfort (M. Zhang et al., 2024).

Postoperative hypothermia is also influenced by the duration of surgery and the type of surgery where the incidence of hypothermia increases in patients with a duration of surgery of >2 hours and the type of major surgery (Sagiroglu et al., 2020). The long duration of surgery will cause spontaneous anesthesia to be longer so that the effect of hoarding drugs and anesthetic agents in the body will be more and more (Gold et al., 2023). In addition, the long duration of surgery also increases the exposure time to the body to cold temperatures (Laroussi, 2020).

Major surgery also affects postoperative hypothermia where the type of major surgery that opens the body cavity will greatly affect the incidence of hypothermia because it is associated with long-term, extensive incisions and often requires fluid to clean the peritoneal area. With these conditions, heat will be lost because the patient's body surface is wet and moist (Y. Zhang et al., 2024).

The effect of hypothermia on the neurological system will cause a decrease in cerebral blood flow of 6-7% with every 10°C decrease in temperature (Ghia et al., 2023). At 30°C (86°F) where the patient does not shiver will experience a decrease in brain metabolism by 30% and cerebral volume by 20%. Sensory function also disappears at 34-33°C.

Hypothermia that occurs within 6 hours can cause disruption of almost all systems in the human body, such as the respiratory, cardiovascular, nervous, urogenital, digestive, and blood clotting systems.

## **METHOD**

This research is an analytical research using a cross sectional design. This study was conducted by taking primary data at the Central Surgical Installation of Dr. M. Djamil Padang Central General Hospital, Padang City, West Sumatra Province in August 2023.

The target population in this study was all postoperative patients aged late adolescence to elderly who were measured postoperative body temperature at Dr. M. Djamil Padang Hospital with the results of 56 samples using consecutive sampling techniques. The data obtained from the results of this study were analyzed using univariate analysis and bivariate analysis. To determine the relationship between variables with a categorical scale, the Spearman-rho correlation test is used.

**RESULTS AND DISCUSSION**

Risk Factors	Body Temperature						r	p-value
	Hypothermia		Usual		Hypertermia			
	f	%	f	%	f	%		
<b>Age</b>								
17-25 years	5	8.9	3	5.4	0	0	0.308	0.021
26-35 years	6	10.7	4	7.1	0	0		
36-45 years	9	16.1	5	8.9	0	0		
46-55 years	10	17.9	1	1.8	0	0		
56-65 years	7	12.5	1	1.8	0	0		
> 65 years old	5	8.9	0	0	0	0		
<b>Gender</b>								
Man	16	28.6	5	8.9	0	0	0.021	0.876
Woman	26	46.4	9	16.1	0	0		
<b>IMT</b>								
Under-weight	8	14.3	4	7.1	0	0	0.140	0.033
Usual	11	19.6	4	7.1	0	0		
Over-weight	3	5.4	2	3.6	0	0		
Obesity I	16	28.6	3	5.4	0	0		
Obesity II	4	7.1	1	1.8	0	0		
				8				
<b>Operation Duration</b>								
Light (0-60 minutes)	0	0	0	0	0	0	0.482	0.027
Medium (60-120 minutes)	10	17.9	4	7.1	0	0		

Weight (>120 minutes)	3	57.	1	17	0	0		
	2	1	0	.9				
<b>Operation Type</b>								
Major	2	41.	7	12	0	0		
	3	1		.5			0.04	
Minor	1	33.	7	12	0	0	1	0.762
	9	9		.5				

Based on the table above, it can be seen that the age of most patients who experience postoperative hypothermia is in the age category of 46-55 years as many as 10 patients (17.9%). From the results of the analysis, a p value of 0.021 ( $p < 0.05$ ) was obtained, which means that there is a significant relationship between age and body temperature of postoperative patients. The closeness of the relationship between the two variables obtained the value of the correlation coefficient ( $r$ ) = -0.308 which means that the two variables have a fairly strong relationship. The r value marked negative (-) indicates the opposite direction of the relationship where the higher the age, the lower the body temperature.

The gender of the most patients who experienced postoperative hypothermia was female as many as 26 patients (46.4%). The results of the analysis showed a p value of 0.876 ( $p > 0.05$ ) with a correlation coefficient ( $r$ ) = 0.021 which means there is no significant relationship between sex and body temperature of postoperative patients.

The BMI of the most patients who experienced postoperative hypothermia was obesity I as many as 16 patients (28.6%). The results of the analysis showed a p value of 0.033 ( $p < 0.05$ ) with a correlation coefficient ( $r$ ) = 0.140 which means there is a significant relationship between BMI and postoperative patient body temperature.

The highest duration of surgery who experienced postoperative hypothermia was the severe duration (>120 minutes) of 32 patients (57.1%). The results of the analysis showed a p value of 0.027 ( $p < 0.05$ ) with a correlation coefficient ( $r$ ) = -0.482 which means there is a significant relationship between the duration of surgery and the patient's body temperature after surgery. The value of the correlation coefficient of these two variables is obtained ( $r$ ) = -0.482 which means that the two variables have a strong relationship that is opposite, where the longer the duration of surgery, the more body temperature will decrease.

The most types of surgery patients who experienced postoperative hypothermia were major as many as 23 patients (41.1%). The results of the analysis showed a p value of 0.762 ( $p > 0.05$ ) with a correlation coefficient ( $r$ ) = 0.041 which means there is no significant relationship between the type of surgery and the patient's body temperature after surgery.

Based on the results of the analysis, it can be seen that the age of patients undergoing surgery the majority that affect body temperature is at the age of 46-55 years (old) and the relationship is significant ( $p < 0.05$ ) with the opposite direction of relationship, where the higher the age, the lower the body temperature so that the risk of hypothermia will increase. This result is in line with the research of Dewi et al in 2022 with the results showing that the age of most patients is in the age category of 46-55 years.<sup>4</sup>

The results of Harahap's research in 2014 explained that the higher the age of the patient, the higher the risk of hypothermia in the perioperative period.<sup>6</sup> Anesthesia performed in old age can cause a shift in the thermoregulation threshold to a higher degree than in young patients. In addition, old age has decreased metabolism, decreased vascular contractility, reduction in subcutaneous fat, and other events making it more susceptible to hypothermia.<sup>7</sup>

The gender of the most patients who underwent surgery that affected body temperature was female as many as 26 patients. However, the results of the analysis showed that there was no significant relationship between sex and body temperature of postoperative patients ( $p > 0.05$ ). This result is in line with research conducted by Cipto et al in 2020 with results showing that there is no relationship between sex and body temperature of postoperative patients.<sup>3</sup> However, the theory put forward by Yousef in Bishop states that women's tolerance to thermoregulation is lower than that of men, so women's risk of hypothermia tends to be higher.<sup>8</sup>

The BMI of most patients undergoing surgery that affects body temperature is obesity I. The results of the analysis showed that a significant relationship was obtained between BMI and body temperature of postoperative patients ( $p < 0.05$ ). This result is in line with research by Dewi et al in 2022 which shows that there is a relationship between BMI and postoperative patient body temperature with a value of  $p = 0.032$  ( $p < 0.05$ ) with a result of  $r = -0.39$ .<sup>4</sup>

The theory states that someone with obesity has a low risk of hypothermia in the intraoperative and postoperative periods because someone with obesity has excess fat reserves that are used for energy sources from the body so that calorie burning does not occur.<sup>9</sup>

The duration of surgery of the most patients who underwent surgery that affected body temperature was the duration of weight as many as 32 patients and the results of the analysis showed a significant relationship between the duration of surgery and the body temperature of postoperative patients ( $p < 0.05$ ) with the direction of the strong relationship opposite which means that the longer the duration of surgery, the lower the body temperature of postoperative patients.

This result is in line with research conducted by Citpo et al that there is a significant relationship between the duration of surgery and the body temperature of postoperative patients with a value of  $p = 0.000$  ( $p < 0.05$ ).<sup>3</sup> Likewise, research conducted by Dewi et al in 2022 showed that there was a significant relationship between the duration of surgery and the body temperature of postoperative patients with a value of  $p = 0.001$  ( $p < 0.05$ ).<sup>5</sup>

The duration of the long operation will spontaneously make the longer the duration of the use of anesthesia so that the effect of hoarding drugs and anesthetic agents in the body will be more. In addition, the longer the body also experiences a decrease in metabolism so that body heat production will decrease.<sup>3</sup>

The most types of surgery that affect the body temperature of postoperative patients are major as many as 23 patients and the results of the analysis show that there is no significant relationship between the type of surgery and the body temperature of postoperative patients ( $p > 0.05$ ).

This result is not in line with research conducted by Dewi et al in 2022 which showed that there was a significant relationship between the type of surgery and the body temperature of postoperative patients with a value of  $p = 0.012$  ( $p < 0.05$ ).<sup>5</sup> The theory put forward by Pramono in 2015 shows that the type of major surgery will greatly affect the incidence of hypothermia

because the type of major surgery can spontaneously prolong the duration of surgery so that the patient's risk of postoperative hypothermia will increase.<sup>10</sup>

## CONCLUSION

Based on the results of the study, it was concluded that there was a significant relationship between age, BMI and duration of surgery with the body temperature of postoperative patients. However, there was no significant relationship between sex and type of surgery with the patient's postoperative body temperature.

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