Research Article

FACTORS ASSOCIATED WITH HYPOTHERMIA POST-SPINAL ANESTHESIA IN THE CENTRAL SURGICAL INSTITUTION AT H. BADARUDDIN KASIM HOSPITAL, TANJUNG TABALONG

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Abstract

Background: *Hypothermia is a decrease in body core temperature <36oC due to disruption of the body's thermoregulatory mechanisms during and in postoperative patients in a central surgical facility. This is influenced by several factors, such as postoperative body temperature, length of operation time, age, gender, and nutritional status of the patient.* ***Purpose:*** *: To determine the factors related to the incidence of hypothermia after spinal anesthesia at the Central Surgical Installation of H. Badaruddin Kasim Tanjung Tabalong Hospital.* ***Methods:*** *This study is a quantitative study correlative with a cross sectional design. The population and sample of the study amounted to 350 respondents who were taken using the total sampling technique. The research instrument is in the form of observation sheets. Data analysis was carried out bivariately using the chi-square test with a significance level of p=0.05.* ***Results:*** *: The results showed that there was a significant relationship between postoperative temperature (p=0.000), nutritional status (p=0.000), age (p=0.006), and sex (p=0.000) and the incidence of hypothermia after spinal anesthesia. Meanwhile, the length of operation time (p=0.342) stated that there was no relationship.* ***Conclusion:*** *Postoperative temperature, nutritional status, age, and gender are factors related to the incidence of hypothermia after spinal anesthesia at the Central Surgical Installation of H. Badaruddin Kasim Tanjung Tabalong Hospital. Efforts are needed to improve the prevention of hypothermia through monitoring body temperature and optimal patient management before and after spinal anesthesia.*

Keywords: *Hypothermia, Spinal Anesthesia, Body Temperature, Nutritional Status, Gender, Age.*

Background

Post-spinal anesthesia hypothermia is a common complication in post-operative patients in central surgical settings. Hypothermia is defined as a decrease in core body temperature below 36°C, resulting from disruption of the body's thermoregulatory mechanisms during and after anesthesia and surgery. Spinal anesthesia can cause peripheral vasodilation and redistribution of heat from the core compartment to the periphery, resulting in a significant decrease in body temperature during the intra- and post-operative periods. This condition often goes unnoticed, but has a serious clinical impact on patient safety3.

Post-anesthetic hypothermia not only causes discomfort in the form of shivering, but can also increase the risk of post-operative complications, such as coagulation disorders, increased bleeding, delayed wound healing, surgical site infections, and prolong recovery time and hospital stay. Furthermore, hypothermia can increase oxygen demand and cardiovascular workload, potentially worsening patient outcomes, particularly in the elderly and those with underlying health conditions. Therefore, preventing hypothermia is an important part of efforts to improve the quality of care and patient safety in the operating room2.

Specific global data for surgical patients under anesthesia worldwide in 2023 is very difficult to find, but the World Health Organization (WHO) reports an increase in the number of surgical patients to approximately 148 million in 2023 from 140 million in 2022, indicating that the majority of these operations require anesthesia, with an estimated 60,000 people per day in the US (old figure) receiving general anesthesia, indicating a large global scale10.

Various factors are known to play a role in the occurrence of post-spinal anesthesia hypothermia, both intrinsic and extrinsic. Intrinsic factors include

the patient's age, gender, and nutritional status. Elderly patients tend to have decreased thermoregulatory abilities due to physiological changes, while patients with poor nutritional status have limited energy reserves and fat tissue to maintain body temperature. 7 Differences in physiological characteristics based on gender can also influence the body's response to temperature changes. Meanwhile, extrinsic factors include the operating room ambient temperature, the duration of the surgical procedure, and the patient's body temperature in the postoperative period3.

H. Badaruddin Kasim Regional General Hospital, Tanjung Tabalong, is a regional referral hospital providing surgical services to the people of Tabalong Regency and the surrounding areas through its Central Surgical Installation. Spinal anesthesia is frequently used in various surgical procedures due to its effectiveness and safety. However, the high number of surgical procedures using spinal anesthesia requires special attention to the risk of post-anesthesia complications, including hypothermia. Based on these conditions, identifying factors associated with the occurrence of post-spinal anesthesia hypothermia is crucial as a basis for planning appropriate preventive interventions4.

Based on this description, the researcher is interested in conducting research on factors related to the occurrence of hypothermia after spinal anesthesia in the Central Surgical Installation of H. Badaruddin Kasim Regional Hospital, Tanjung Tabalong. The results of this study are expected to contribute to improving the quality of anesthesia services and perioperative nursing, particularly in efforts to prevent hypothermia to support the safety and comfort of postoperative patients.

Method

This quantitative, correlative study employed a cross-sectional design. The aim of this study was to determine the relationship between factors associated with the incidence of post-spinal anesthesia hypothermia in the Central Surgical Unit of H. Badaruddin Kasim Regional Hospital, Tanjung Tabalong.

The independent variables in this study were post-operative temperature, nutritional status, age, and gender, and the dependent variable was the incidence of post-spinal anesthesia hypothermia.

This study was conducted in the Central Surgical Unit of H. Badaruddin Kasim Regional Hospital, Tanjung Tabalong. The population consisted of all 350 patients undergoing surgery under spinal anesthesia. The sample size of 350 respondents was selected using a total sampling technique. The entire population was selected while the patients were in the post-operative recovery room.

The instrument used in this study was an observation sheet to record the patients' post-operative body temperature and the respondents' characteristics, including nutritional status, age, and gender. The incidence of hypothermia was determined based on the measurement of the patients' post-operative body temperature using a digital thermometer.

The data analysis used in this study was bivariate analysis using the chi-square test with a significance level of $p<0.05$ to determine the relationship between the independent variables and the dependent variable.

Results and Discussion

Table 1. Frequency Distribution of Respondent Characteristics

Respondent Characteristics	F	%
Age		
Teenagers (17-24 Years)	46	13.1
Adults (25-59 Years)	256	73.1
Seniors ((>60 Years)	48	14.4
Gender		
Man	58	16.6
Woman	292	83.4
Total	350	100

Based on Table 1, the frequency distribution of respondent characteristics, it is known that of the 350 respondents, the majority were in the adult age category (25-59 years old), amounting to 256 respondents (73.1%), while 46 respondents (13.1%) were in the adolescent age category (17-24 years old), and 48 respondents (13.7%) were in the elderly age category (>60 years old). This indicates that the respondents in this study were predominantly in the adult age group (25-59 years old).

Based on gender, the majority of respondents were female, amounting to 292 respondents (83.4%), while 58 respondents were male (16.6%). Therefore, it can be concluded that the majority of respondents in this study were female.

Table 2. Frequency Distribution of Length of Operation, Post-Operative Temperature, Nutritional Status and Hypothermia Incidents

Variables	F	%
Operation Time		
≤ 2 Hours	332	94.9
> 2 Hours	18	5.1
Postoperative Temperature		
< 36 °C	305	87.1
≥ 36 °C	45	12.9
Nutritional Status		

Low BMI	220	62.9
Normal BMI	114	32.6
High BMI	16	4.6
Hypothermia Incident		
Yes	305	87.1
No	45	12.9
Total	350	100

Based on Table 2 regarding the frequency distribution of length of surgery, postoperative temperature, nutritional status, and hypothermia incidents, it is known that the majority of respondents underwent surgery with a duration of surgery ≤ 2 hours, namely 332 respondents (94.9%), while respondents with a duration of surgery > 2 hours numbered 18 respondents (5.1%). Based on postoperative temperature, the majority of respondents had a body temperature < 36°C, namely 305 respondents (87.1%), while respondents with a temperature ≥ 36°C numbered 45 respondents (12.9%). This indicates that most respondents experienced a decrease in body temperature after surgery. In the nutritional status variable, the majority of respondents had an abnormal nutritional status (Low BMI) namely 220 respondents (62.9%), while respondents with normal nutritional status numbered 114 respondents (32.6%) and there were 16 respondents (4.6%) who had a high BMI. Based on the incidence of hypothermia, it is known that the majority of respondents experienced hypothermia, namely 305 respondents (87.1%), while respondents who did not experience hypothermia numbered 45 respondents (12.9%).

Table 3. Results of the Analysis of the Relationship between Factors and the Incidence of Post-Spinal Anesthesia Hypothermia

	Hypothermia Incident		
	n	**Sig (p-Value)**	**r**
Duration of Surgery	350	0.342	0.951
Postoperative	350	0,000	0.951
Temperature	350	0,000	0.951
Nutritional Status	350	0,000	0.951
Age	350	0,006	0.951
Gender	350	0,000	0.951

Based on Table 3, the analysis of the relationship between factors and the incidence of post-spinal anesthesia hypothermia using the chi-square test reveals that the duration of surgery did not significantly correlate with the incidence of post-spinal anesthesia hypothermia, with a p-value of 0.342 (p>0.05). This indicates that the duration of surgery is not a factor associated with the incidence of hypothermia in post-spinal anesthesia patients.

Meanwhile, post-operative temperature significantly correlated with the incidence of post-spinal anesthesia hypothermia, with a p-value of 0.000 (p<0.05). Nutritional status also significantly correlated with the incidence of hypothermia, with a p-value of 0.000 (p<0.05). Furthermore, age significantly correlated with the incidence of post-spinal anesthesia hypothermia, with a p-value of 0.006 (p<0.05), and gender significantly correlated with the incidence of hypothermia, with a p-value of 0.000 (p<0.05).

The results of the analysis also showed that all variables that had a significant relationship had a correlation coefficient value (r=0.951) which indicated a very strong relationship with the incidence of post-spinal anesthesia hypothermia.

Discussion

The Relationship Between Length of Surgery and the Incidence of Post-Spinal Anesthesia Hypothermia

The results of the study showed that surgical duration was not significantly associated with the incidence of post-spinal anesthesia hypothermia, with a p-value of 0.342 (p>0.05). This result indicates that surgical duration is not a factor directly related to the occurrence of hypothermia in post-spinal anesthesia patients at the Central Surgical Installation of H. Badaruddin Kasim Regional Hospital, Tanjung Tabalong.

Based on the data, the majority of respondents underwent surgery lasting ≤ 2 hours (332 respondents (94.9%), while 18 respondents (5.1%) underwent surgery lasting > 2 hours.

These results align with research by Pratiwi and Handayani (2019)[8], which stated that surgical duration was not significantly associated with the incidence of post-surgical hypothermia, as the decrease in body temperature is more influenced by the mechanism of anesthesia and the patient's physiological condition than by the duration of surgery.

However, these results disagree with research by Sessler (2016),[2] which states that long surgical duration can increase body heat loss. This difference in results is possible because the majority of respondents in this study underwent surgery lasting ≤ 2 hours so that the risk of heat loss due to environmental exposure was relatively smaller.

The Relationship Between Postoperative Temperature and the Incidence of Post-Spinal Anesthesia Hypothermia

The results showed a significant correlation between postoperative body temperature and the incidence of post-spinal anesthesia hypothermia, with a p-value of 0.000 (p<0.05). This indicates that patients with a postoperative body temperature <36°C have a higher risk of hypothermia.

Based on the data above, most respondents had a

postoperative body temperature <36°C (305 respondents (87.1%), while 45 respondents (12.9%) had a body temperature ≥36°C.

The results of this study align with those of Sessler and Kurz (2018)[3], which stated that a decrease in postoperative body temperature is a primary indicator of hypothermia due to heat redistribution after spinal anesthesia. Spinal anesthesia causes peripheral vasodilation, shifting body heat from the core to the periphery, resulting in a significant decrease in body temperature. Therefore, monitoring postoperative body temperature is crucial in preventing hypothermia.

Research from Sujadi, Suharmanto and Indrawan, (2025)[6] states that post-operative body temperature also affects the occurrence of hypothermia after spinal anesthesia, which is proven by the statement that in spinal anesthesia, a block occurs in the sympathetic system so that vasodilation occurs which results in heat transfer from the central compartment to the periphery, this will cause hypothermia. In addition, one of the effects of anesthetic drugs that can cause hypothermia is a shift in the threshold in thermoregulation so that the body responds more quickly to a decrease in temperature. Thermoregulatory elements consisting of efferent input elements, in addition, can also result in the loss of the adaptation process and disrupt the physiological mechanism of fat/skin in the thermoregulatory function, namely by shifting the threshold in the response to the process of vasoconstriction, shivering, vasodilation and also the occurrence of sweating.

The Relationship Between Nutritional Status and the Incidence of Post-Spinal Anesthesia Hypothermia

Based on the analysis, nutritional status was significantly associated with post-spinal anesthesia hypothermia with a p-value of 0.000 (p<0.05). Patients with abnormal nutritional status experienced hypothermia more often than patients with normal nutritional status.

Regarding nutritional status, the majority of respondents had an abnormal nutritional status (low BMI), amounting to 220 respondents (62.9%), while 114 respondents (32.6%) had normal nutritional status, and 16 respondents (4.6%) had a high BMI.

These results align with research by Putri and Sari (2020)[7], which states that nutritional status affects the body's ability to maintain body temperature because fat tissue acts as a heat insulator. Patients with poor nutritional status have lower energy reserves and fat tissue, making them more susceptible to heat loss during and after anesthesia.

Research conducted by Hafiduddin, Tarigan, and Fernanda (2025)[11] states that Body Mass Index (BMI) is a risk factor for hypothermia in patients undergoing spinal anesthesia. Patients with a low BMI tend to have a thinner subcutaneous fat layer, which acts as a thermal insulator, compared to those with a normal or high BMI.

The Relationship Between Age and the Incidence of Post-Spinal Anesthesia Hypothermia

The results of the study showed a significant association between age and the incidence of post-spinal anesthesia hypothermia, with a p-value of 0.006 (p<0.05). This indicates that adults and the elderly are at higher risk of hypothermia than adolescents.

Based on the data, of the 350 respondents, the majority were in the adult age category (25-59 years), representing 256 (73.1%), followed by adolescents (17-24 years) representing 46 (13.1%), and elderly (>60 years) representing 48 (13.7%).

These results align with research by Guyton and Hall (2021)[4], which states that the aging process leads to a decline in the body's thermoregulatory ability, including a decrease in basal metabolism and a vasoconstrictive response to cold temperatures. This condition makes elderly patients more susceptible to post-anesthesia hypothermia.

Research by Qoriah et al. (2025)[9] states that adults and elderly patients are more susceptible to hypothermia due to physiological changes in the body's thermoregulatory system. The function of the central nervous system, which regulates body temperature, tends to decline in those aged >45 years, resulting in a reduced response to cold.

The Relationship Between Gender and the Incidence of Post-Spinal Anesthesia Hypothermia

The results of the study showed a significant association between gender and the incidence of post-spinal anesthesia hypothermia with a p-value of 0.000 (p<0.05). Female patients experienced hypothermia more often than male patients.

Based on gender, the majority of respondents were female (292 respondents (83.4%), while 58 respondents (16.6%) were male. Therefore, it can be concluded that the majority of respondents in this study were female.

These results align with research by Smeltzer et al. (2018)[5], which states that differences in body composition and hormones in women, such as lower fat and muscle mass percentages compared to men, can affect body heat distribution, thereby increasing the risk of hypothermia.

Research by Qoriah et al. (2025)[9] indicates that women experience post-operative hypothermia more frequently than men, due to hormonal influences that lead to differences in the body's thermoregulation process.

Conclusion

Based on the research results, it can be concluded that postoperative temperature, nutritional status, age, and gender are factors significantly associated with the incidence of post-spinal anesthesia hypothermia in the Central Surgical Installation of H. Badaruddin Kasim Regional Hospital, Tanjung Tabalong. Meanwhile, the duration of surgery was not significantly associated with the incidence of post-spinal anesthesia hypothermia.

These results demonstrate the importance of post-operative body temperature monitoring and attention to patient condition based on nutritional status, age, and gender as a means of preventing hypothermia. Healthcare professionals are expected to improve perioperative management to minimize the risk of hypothermia and improve patient safety after spinal anesthesia.

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