

INCIDENCE OF SHIVERING POST SPINAL ANESTHESIA BASED ON SURGERY DURATION

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ABSTRACT

Spinal anesthesia is a form of regional anesthesia frequently used in surgeries involving the lower extremities and the lower abdomen. One of the complications following spinal anesthesia is shivering. This study aimed to determine the relationship between surgery duration and the incidence of shivering in patients following spinal anesthesia in the Recovery Room at Gatoel Hospital. The study employed an analytical observational design with a cross-sectional approach. The sample consisted of 40 patients who underwent surgery under spinal anesthesia, selected using a non-probability sampling technique. Data were obtained from medical records and the Bedside Shivering Assessment Scale (BSAS), then analyzed using the Spearman's Rho test. The results showed a significant relationship between the duration of surgery and the incidence of shivering ($p=0.000$; $\alpha=0.05$). The longer the duration of surgery, the higher the risk of shivering, particularly in surgeries lasting 60–120 minutes. This is believed to be caused by exposure to low operating room temperatures and impaired body temperature regulation due to the effects of spinal anesthesia.

Keywords: *shivering, Anestesi spinal, recovery room*

INTRODUCTION

Spinal anesthesia is a regional anesthesia method frequently used in various surgical procedures, particularly in lower extremity and lower abdominal surgeries, as it provides effective analgesia while reducing the need for general anesthesia. However, one of the common post-spinal anesthesia complications is shivering, which can increase oxygen consumption, cause discomfort to the patient, and heighten hemodynamic risks if not managed optimally. These cases of shivering are often observed during the early stages of recovery in the recovery room, making them a critical issue in the fields of perioperative care and anesthesiology for improving postoperative patient safety and comfort (Amiarti et al., 2024). In the early phase of recovery following anesthesia, shivering often occurs; it can be defined as the emergence of involuntary, oscillating muscle activity.

Operative duration, age, body mass index (BMI), gender, and room temperature are some of the factors that can trigger shivering in patients undergoing surgery under spinal anesthesia (Nafidah, 2022). One of the factors causing shivering is the duration of surgery; research from (Qoriah & Sitindaon, 2025) shows that the duration of surgery has a significant influence on cases of shivering, particularly when anesthetic agents have higher concentrations in the blood and tissues (especially lipids) and when the duration of surgery is longer. Longer surgical durations result in prolonged administration of anesthesia, leading to increased accumulation of drugs and anesthetic agents in the body. This indicates that shivering not only affects patient comfort but also safety and the quality of post-anesthesia care (Wang & Deng, 2023).

Several previous studies have examined the relationship between surgery duration and the incidence of shivering following spinal anesthesia. A study by Annasy & Sari, (2025) reported that the majority of patients experienced shivering after surgery under spinal anesthesia. The findings of a study by Aziz et al., (2024), also found that more than half of the respondents experienced shivering of varying degrees of severity. Meanwhile, the results of a study by Sabilah et al., (2025) indicate that longer surgery duration tends to increase the severity of shivering, though this association did not reach statistical significance. Research findings in the fields of anesthesia and perioperative nursing also show that a combination of nonpharmacological and pharmacological interventions provides greater effectiveness compared to using a single method alone. Nurses play a crucial role in the prevention and management of shivering in the recovery room through regular monitoring of patients' body temperature, identification of risk factors such as prolonged surgery duration, and the implementation of interventions in accordance with the "protocol" (Nuryanti et al., 2025).

Based on the results of a preliminary study conducted in November 2025 in the recovery room at IHC Gatoel Hospital in Mojokerto, approximately 320 patients underwent surgical procedures under spinal anesthesia over the past three months. Initial observations of five patients revealed that three experienced shivering during the postoperative recovery phase. These findings indicate that shivering remains a clinical issue requiring attention; therefore, a study is needed to investigate the relationship between surgery duration and the incidence of shivering in patients following spinal anesthesia in the IHC recovery room at Gatoel Hospital in Mojokerto. This study aims to analyze the relationship between surgery duration and the incidence of shivering in patients following spinal anesthesia in the IHC recovery room at Gatoel Hospital in Mojokerto.

METHODE

A research method is a systematic procedure and set of steps used to answer a specific research question (Mayasari & Hasdianah, 2021). The method used for this study was a quantitative, observational, analytical study with a cross-sectional approach, aimed at identifying a relationship between the duration of surgery and the incidence of shivering.

This study was conducted at Gatoel Hospital in Mojokerto. In accordance with the research problem addressed in this study, the research began with direct observation conducted on Monday, February 9, 2026, with the aim of identifying the existing problems. After the initial data were collected, the researchers conducted direct observations of postoperative patients who had undergone spinal anesthesia in the recovery room. After all the data were collected, the researcher performed an analysis to obtain the research results.

The population refers to the entire group of individuals or objects that will be described or for which the research findings are intended to be generalized (Swarjana, 2022). The study population consisted of all patients who underwent surgery under spinal anesthesia at IHC Gatoel Hospital in Mojokerto over a 10-day period; a total of 40 patients were identified. The study sample comprised 40 respondents selected using non-probability sampling with the consecutive sampling method. Inclusion criteria included patients who underwent spinal anesthesia, both male and female; whether or not they experienced shivering after spinal anesthesia; were treated in the recovery room; met the criteria for assessing the degree of shivering; and were adolescents, adults, or the elderly. Exclusion criteria included patients with limited literacy, those who were toddlers (0–5 years) or

children (6–11 years), those undergoing emergency surgery, and patients undergoing cesarean section.

This research proposal has been reviewed by the ethics committee under letter number (KEP) 125. Data collection was conducted using medical records to obtain information on respondent characteristics and surgery duration. Shivering episodes were measured through observation using the Bedside Shivering Assessment Scale (BSAS) in the recovery room. The data obtained were then edited, coded, scored, and tabulated before analysis.

Data analysis was performed using univariate and bivariate methods. Univariate analysis was used to describe the characteristics of the respondents, the duration of surgery, and the incidence of shivering in the form of frequency distributions and percentages. Bivariate analysis is a method of data analysis that seeks correlations, relationships, or influences between two or more variables under study (Ixora & Wulandari, 2025). The analysis used the Spearman's rho test with a significance level (α) of 0.05 to examine the relationship between surgery duration and the incidence of shivering in patients following spinal anesthesia. A relationship between variables was considered statistically significant if a p-value of ≤ 0.05 was obtained. Additionally, the correlation coefficient (r) was used to determine the strength and direction of the relationship between the two variables.

FINDINGS AND DISCUSSION

RESEARCH RESULTS

Table 1: Frequency Distribution of Respondent Characteristics at Gatoel Hospital, Mojokerto

NO	Age	Frequency (n)	Percentage (%)
1	Adolescents aged 10–18 years	2	5.0
2	Adults aged 19–59 year	16	40.0
3	Seniors 60+	22	55.0
	Gender		
1	Male	12	30.0
2	Female	28	70.0
	Body mass index (BMI)		
1	Underweight	2	5.0
2	Normal	34	85.0
3	Overweight	4	10.0
	Total	40	100

The characteristics of respondents by age in Table 1 above show that the majority of respondents were 60 years of age or older, totaling 22 respondents (55.0%). By gender, 28 respondents (70.0%) were female. By body mass index (BMI), 36 respondents (90.0%) had a normal BMI.

Table 2: Frequency Distribution of Respondents' Surgery Duration at Gatoel Hospital, Mojokerto

NO	Surgery Duration	Frekuensi (n)	Percentage (%)
1	≤ 60 minutes	14	35.0
2	60 – 120 minutes	26	65.0
3	>120 minutes	0	0
	Total	40	100

Table 2: Based on the duration of surgery, 26 respondents (65%) reported a duration of 60–120 minutes.

Tabel 3: Frequency Distribution of Shivering Among Respondents at Gatoel Hospital, Mojokerto

NO	Shivering	Frequency (N)	Percentage(%)
1	Grade 0	18	45.0
2	Degree 1	0	0.0
3	Degree 2	0	0.0
4	Degree 3	22	55.0

Table 3 shows the characteristics of the respondents based on the severity of shivering, with 22 respondents (55.0%) experiencing shivering at level 3.

Tabel 4: Relationship Between Surgery Duration and the Incidence of Shivering at Gatoel Hospital

Total Shivering									
NO	Grade 0		Grade 1		Grade 2		Grade 3		
	F(n)	P(%)	F(n)	P(%)	F(n)	P(%)	F(n)	P(%)	
Durasi operasi									
1 ≤60 Minutes	14	100.0	0	0.00	0	0.00	0	0.00	14
2 60-120 Minutes	4	15.4	0	0.00	0	0.00	22	84.6	26
3 >120 Minutes	0	0.00	0	0.00	0	0.00	0	0.00	0
Total	18		0		0		22		40
Spearman's rho test, p-value 0.000 < 0.05									

Based on Table 4, all respondents with an operation duration of ≤60 minutes were classified as having grade 0 shivering, totaling 14 respondents (100%). Meanwhile, in the group of respondents with an operation duration of 60–120 minutes, the majority experienced grade 3 shivering (22 respondents, 84.6%), while 4 respondents (15.4%) experienced grade 0 shivering. Analysis using Spearman's rho test showed a p-value of 0.000 ($p < 0.05$) with a correlation coefficient (r) of 0.811, indicating a significant association between surgery duration and the occurrence of shivering in patients following spinal anesthesia.

DISCUSSION

Spinal anesthesia is a type of anesthesia used for patients undergoing general surgery, such as orthopedic and obstetric-gynecologic procedures-particularly surgeries involving the lower extremities-which generally require relatively long operating times, especially in patients undergoing orthopedic surgery. The more complex the surgical procedure, the longer it takes to complete, thereby increasing the duration of the surgery and the patient's exposure to the effects of anesthesia and the operating room environment. The results of this study align with research conducted (Hasan & Yudono, 2024), which states that patients with surgery durations of 60–120 minutes have a higher risk of experiencing shivering compared to patients with shorter surgery durations. The effects of spinal anesthesia during short surgical procedures do not fully inhibit peripheral vasoconstriction and the shivering mechanism, which are the body's efforts to maintain core body temperature (Sessler, 2022). This study aligns with the research (Renaningtyastutik, 2022), which also states that the large number of respondents with surgery durations of 60–120 minutes is one of the main factors contributing to the occurrence of shivering following spinal anesthesia.

The longer a surgical procedure lasts, the greater the loss of body heat due to exposure to the operating room temperature, exposed body surfaces, and evaporation during surgery. These conditions cause a decrease in core body temperature, which triggers a compensatory response in the form of shivering. The results of this study are also supported by the study “ , which reported that longer surgical durations result in prolonged exposure to the effects of anesthesia and ambient temperature, thereby increasing the risk of shivering.

The results of this study indicate that for surgeries lasting 60–120 minutes, 26 respondents (65%) experienced shivering, with 22 respondents (55%) experiencing grade 3 shivering. This is attributed to several factors from the respondents' general demographic data, including age, gender, and body mass index (BMI), which may contribute to the occurrence of shivering. The results of this study indicate that for surgeries lasting 60–120 minutes, the majority of respondents 26 respondents (65%) experienced shivering, with 22 respondents (55%) exhibiting grade 3 shivering. This condition is influenced by several respondent characteristics, including age, gender, and body mass index (BMI), which play a role in the body's ability to regulate temperature during surgical procedures under spinal anesthesia. Based on age, older respondents tend to be more susceptible to shivering due to a decline in thermoregulatory function. Spinal anesthesia causes peripheral vasodilation and the redistribution of heat from the body's core to the periphery; consequently, in older adults, compensatory mechanisms such as vasoconstriction and heat production do not function optimally, triggering shivering (Vassilieff & Rosencher, 2022). The results of this study are also consistent with the research (Sessler, 2022), which states that the thermoregulatory threshold in older patients is lower than in younger patients, thereby increasing the risk of shivering during spinal anesthesia.

These findings have implications for perioperative nursing practice, particularly in terms of increasing vigilance toward patients undergoing longer surgical procedures. Nurses in the recovery room are expected to monitor body temperature periodically and implement shivering prevention measures, such as the use of warming blankets and interventions in accordance with standard of care. Future research is recommended to involve a larger sample

size and consider other factors that may influence the incidence of shivering in order to obtain more comprehensive scientific evidence.

CONCLUSION

Based on the study “The Relationship Between Surgery Duration and the Incidence of Shivering After Spinal Anesthesia in the Recovery Room at Gatoel Hospital,” the following conclusions can be drawn: Based on the analysis results, the surgery duration in this study was 60–120 minutes for 26 respondents. The incidence of shivering was most frequently observed at grade 3, involving a total of 22 respondents. The Spearman’s rho test rejected H_0 and accepted H_1 , indicating that there is a relationship between the duration of surgery and the incidence of shivering following spinal anesthesia in the recovery room at Gatoel Hospital, with a p-value of 0.000. The strength of the relationship is very strong, as evidenced by a correlation coefficient of 0.811. The longer the duration of surgery, the greater the loss of body heat and the higher the risk of shivering in patients after spinal anesthesia. In addition, a longer duration of surgery results in prolonged exposure of the body to the operating room temperature and exposed body surfaces, thereby increasing heat loss; this condition contributes to the high incidence of shivering in patients after spinal anesthesia. The two variables show a parallel correlation; there is a relationship with the same direction, meaning that the longer the duration of surgery, the higher the risk of shivering.

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