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Increasing Body Temperature of Hypothermic Patients Post Anesthesia Subarachnoid Block with Fluid Warmer and Blanket Warmer

Ahmad Mahin*, Nurul Mawaddah, Henry Sudiyanto
Undergraduate Nursing Study Program, STIKES Majapahit Mojokerto, Jl. Raya GayamanGayaman, Mojoanyar, Mojokerto, East Java 61364, Indonesia
*ahmadmahin15@gmail.com

ABSTRACT

Hypothermia causes discomfort to the patient and leads to dangerous complications. Nonpharmacological treatments for hypothermia include using fluid warmers and blanket warmers. This study aimed to determine the difference in the effectiveness of fluid warmers and blanket warmers on the body temperature of hypothermic patients after subarachnoid block anesthesia. This research is a quasi-experiment with a non-equivalent comparison group design. The research subjects included hypothermic patients after subarachnoid block anesthesia in the Recovery Room of Dr. Mohamad Soewandhie Surabaya Hospital. The sample amounted to 82 people divided into 2 groups: 41 in the fluid-warmer group and 41 in the blanket-warmer group. The sampling technique used was Simple Random Sampling. Data analysis using Paired T-Test and Independent T-Test. The results showed that after 30 minutes, the average increase in body temperature in the fluid warmer group was 1.78oC, the average increase in body temperature in the blanket warmer group was 1.18oC, and the difference in the average value of body temperature increase between the fluid warmer and blanket warmer groups was 0.59oC. The p-value in the Independent T-Test test results is 0.000. Based on decision-making in the Independent T-Test Test, the p-value is less than 0.05, meaning that the average body temperature increase between the fluid-warmer and blanket-warmer groups is significantly different. Looking at the results of the above study, it can be concluded that there are differences in the effectiveness of fluid and blanket warmers on the body temperature of patients with hypothermia after subarachnoid block anesthesia. Among the two interventions, the use of fluid warmers is a therapy that is more effective in increasing the body temperature of hypothermic patients after subarachnoid block anesthesia, so researchers suggest that the use of fluid warmers can be used as an option therapy in increasing the body temperature of hypothermic patients.

Keywords: blanket warmer; fluid; hypothermia; subarachnoid block anesthesia

INTRODUCTION

Hypothermia is when the core body temperature drops below 36.5oC (Sainsbury, 2017). The incidence of postoperative hypothermia is often associated with the effects of anesthesia. One anesthetic technique that often causes hypothermia is subarachnoid block (SAB) anesthesia (Isngadi, 2020). Hypothermia usually causes the nervous system and organs not to work. Hypothermia also causes cardiac dysrhythmias and interferes with surgical wound healing. Perioperative patients who experience hypothermia have been associated with an incidence of perioperative complications if not adequately controlled. Hypothermia plays a vital role in perioperative morbidity (Sainsbury, 2017).

The research results by Awwaliyah et al. (2020) stated that the incidence of postoperative hypothermia at Karya Husada Batu General Hospital reached 85%. Meanwhile, Mamola's research (2020) stated that almost 79.4% of patients experienced postoperative hypothermia with spinal anesthesia. Medical Record Data at Dr. Mohamad Soewandhie Surabaya Hospital from August to October 2022 recorded the number of surgery patients who used SAB anesthesia as many as 384 people. The average number of SAB surgery patients per month is 128 patients, and as many as 104 patients (81%) experience hypothermia. Some nursing actions to deal with hypothermic patients include providing warmth internally and externally. Internal warming actions include giving infusion fluids warmed with a fluid warmer. At the

same time, External warming actions include providing an electric warming blanket or blanket warmer (Yi et al., 2017).

Fluid warmers and blanket warmers are commonly used in the non-pharmacological management of postoperative hypothermic patients in the Recovery Room (RR) of Dr. Mohamad Soewandhie Hospital Surabaya. However, the two interventions have never been evaluated regarding the difference in effectiveness. Seeing the description above, the authors are interested in analyzing the effectiveness of fluid warmers and blanket warmers on the body temperature of hypothermic patients after subarachnoid block anesthesia in the Recovery Room of RSUD Dr. Mohamad Soewandhie Surabaya.

METHOD

This study was conducted in the Recovery Room of Dr. Mohamad Soewandhie Surabaya Hospital in January 2023 with data collection techniques using observation methods. This type of research is a quick experiment with a non-equivalent comparison group design (a pre-test precedes each group, then given a different treatment, after which a post-test is carried out) with the independent variable fluid warmer and blanket warmer, and the dependent variable is body temperature. The total sample of 82 people was divided into two groups: 41 people in the fluid warmer group using Ringer Lactate liquid brand B Braun with a dose of 50 ml/kg BW / 24 hours and 41 people in the blanket warmer group, which was set at 380C. Sampling was done by simple random sampling technique on all patients who experienced hypothermia after SAB anesthesia in the Recovery Room. Data analysis includes univariate and bivariate analysis with a data scale using a ratio scale (numeric). In this study, univariate analysis used descriptive statistical analysis to determine the characteristics of respondents. At the same time, bivariate analysis used the Paired T-test test and the Independent T-test test at a significance level of 5% (0.05). The normality test of this study used the Kolmogorov-Smirnov test, while the homogeneity test used the Levene test.

RESULTS

Table 1.
Frequency Distribution of Respondent Characteristics by Gender at Dr. Mohamad Soewandhie Surabaya Hospital in 2023 (n=41)

Gender	Fluid Warmer Group		*Blanket Warmer* Group	
	f	%	f	%
Male	18	44	11	27
Female	23	56	30	73

Table 1 shows that the majority of respondents were female in both the fluid warmer and blanket warmer groups.

Table 2.
Frequency Distribution of Respondent Characteristics by Age Group at Dr. Mohamad Soewandhie Surabaya Hospital in 2023 (n=41)

Age Group	*Fluid Warmer Group*		*Blanket Warmer* Group	
	f	%	f	%
Late Adolescence	3	7	6	15
Early Adulthood	19	46	22	53
Late Adulthood	13	32	9	22
Early Elderly Period	6	15	4	10
Late Elderly Period	0	0	0	0
Elderly Period	0	0	0	0

Table 2 shows that most of the respondents in the fluid warmer and blanket warmer groups were in the age range of 26-35 years (early adulthood).

Table 3.
Frequency Distribution of Respondent Characteristics According to Body Mass Index at Dr. Mohamad Soewandhie Surabaya Hospital in 2023 (n=41)

Body Mass Index	*Fluid Warmer Group*		*Blanket Warmer* Group	
	f	%	f	%
Underwieght (<18,5)	0	0	0	0
Normal (18,5-22,9)	12	29	7	17
Overweight (23–24,9)	16	39	13	32
Obesitas 1 (25-29,9)	13	32	21	51
Obesitas 2 (≥30)	0	0	0	0

Table 3 shows that most respondents in the fluid warmer group fall into the overweight category. While most of the respondents in the blanket warmer group fell into the obesity 1 category.

Table 4.
Results of Paired T-Test Test (Paired Sample Statistic Table) Differences in Body Temperature Before and After Giving Fluid Warmer at Dr. Mohamad Soewandhie Surabaya Hospital in 2023 (n=41)

Data	f	Average	Standar deviation
Pre Test	41	33,31	0,78
Post Test	41	35,09	0,77

Table 4 shows that the average value of body temperature before giving fluid warmer is 33.31^{o}C and the average value of body temperature after giving fluid warmer is 35.09^{o}C.

Table 5.
Results of Paired T-Test (Paired Sample Test Table) Differences in Body Temperature Before and After Giving Fluid Warmer at Dr. Mohamad Soewandhie Surabaya Hospital in 2023 (n=41)

Data	Average increments	Standar deviasi	Sig (2-tailed)
Post Test - Pre Test	1,78	0,14	0,000

Table 5 shows that there is a significant difference between body temperature before and after giving fluid warmer or there is an effect of fluid warmer in increasing the body temperature of hypothermic patients.

Table 6.
Results of Paired T-Test (Paired Sample Test Table) Differences in Body Temperature Before and After Giving Fluid Warmer at Dr. Mohamad Soewandhie Surabaya Hospital in 2023 (n=41)

Data	f	Average	Standar deviation
Pre Test	41	33	0,74
Post Test	41	34,19	0,70

Table 6 shows that the average body temperature before the blanket warmer was 33^{o}C and after the blanket warmer was 34.19^{o}C.

Table 7.
Results of Paired T-Test (Paired Sample Test Table) Differences in Body Temperature Before and After Giving Blanket Warmer at Dr. Mohamad Soewandhie Surabaya Hospital in 2023 (n=41)

Data	Average increments	Standar deviasi	Sig (2-tailed)
Post Test - Pre Test	1,18	0,14	0,000

Table 7 shows that there is a significant difference between body temperature before and after giving blanket warmer or there is an effect of blanket warmer in increasing the body temperature of hypothermic patients.

Table 8.
Results of Independent T-Test Test (Table Group Statistics) Differences in Body Temperature Increase Between After Being Given Fluid Warmer and Blanket Warmer at Dr. Mohamad Soewandhie Surabaya Hospital in 2023 (n = 41)

Kelompok	f	Average increments	Standar deviation
Fluid Warmer	41	1,78	0,14
Blanket Warmer	41	1,18	0,14

Table 8 shows that the average value of body temperature increase in the fluid warmer group is higher than the average value of body temperature increase in the blanket warmer group.

Table 9.
Results of Independent T-Test (Independent Samples Test Table) Differences in Body Temperature Increase Between After Being Given Fluid Warmer and Blanket Warmer at Dr. Mohamad Soewandhie Surabaya Hospital in 2023 (n=41)

Independent T-test	Sig. (2-tailed)	Difference Average increase
Equal variances assumed	0,000	0,59
Equal variances not assumed	0,000	0,59

Table 9 shows that the average value of body temperature increase between the fluid warmer group and the blanket warmer group is significantly different.

DISCUSSION

Among the 41 respondents, the majority in both the fluid warmer and blanket warmer groups were female, with an age range of 26-35 years, representing early adulthood. The body mass index distribution revealed that 39% of the fluid warmer group were in the overweight category, while 51% of the blanket warmer group were in the obesity 1 category. In this study, there was a significant difference between body temperature before and after giving fluid warmers, or there was an effect of fluid warmers on increasing the body temperature of hypothermic patients. Giving fluid warmer using B Braun brand lactated Ringer liquid at a dose of 50 ml/kg BW / 24 hours for 30 minutes and with a frequency of 1 time can increase the average body temperature by 1.78oC. This is in line with the results of research by Awwaliyah et al. (2020), which shows that the act of giving warm infusions to postoperative patients can increase the body temperature of 17 respondents who experienced hypothermia in the Recovery Room RSU Karsa Husada Batu. Another study conducted by Cahyawati et al. (2019) at PKU Muhammadiyah Gamping Hospital also showed that giving warmed infusion fluid could normalize the body temperature of hypothermic patients.

According to Sukarja et al (2018), warm infusion fluids given intravenously play a crucial role in minimizing body heat loss. They stimulate the hypothalamus, which in turn activates the thermoregulatory system response. The hypothalamus detects changes in temperature in the blood vessels and monitors the level of heat in the blood flowing to the brain. This triggers vasodilation of blood vessels, leading to increased blood flow and efficient heat conduction from the body parts to the skin. In this study, it was also found that there was a significant difference between body temperature before and after giving blanket warmers, or there was an effect of blanket warmers in increasing the body temperature of hypothermic patients. Giving a blanket warmer for 30 minutes with a frequency of 1 can increase the average body temperature by 1.18oC. This is in line with the research results by Rositasari et al. (2017), which showed that giving blanket warmers affected normalizing the temperature in post-

surgical patients who experienced hypothermia in the Recovery Room of PKU Muhammadiyah Surakarta Hospital.

Another study conducted by Suswitha (2018) also mentioned the same results: blanket warmers (electric blankets) could normalize the temperature of hypothermic patients in postoperative patients at the Central Surgical Installation of the Palembang BARI Regional Hospital. Paul et al. (2016) said that when using blanket warmers, conduction occurs in body tissues, affecting vasomotor mechanisms and arterial vasodilation from the hypothalamus response, resulting in increased blood flow to capillaries, increased metabolism, and increased temperature. Blanket warmers create a warm environment and prevent heat from leaving the body. From the results of the temperature assessment of the two groups above, it was found that the average value of the increase in body temperature in the fluid-warmer group was higher than that in the blanket-warmer group, so it can be said that the fluid-warmer intervention was faster in increasing the body temperature of hypothermic patients compared to the blanket warmer intervention. The difference in the average value of body temperature increase between the fluid warmer and blanket warmer groups is 0.59oC, with a Sig. (2-tailed) value on Equal variances assumed of 0.000 ($p < 0.05$). This means that the average body temperature increase between the fluid and blanket warmer groups is significantly different.

This is in line with the results of research by Awwaliyah et al. (2020), which shows that the act of giving a warm infusion can increase the body temperature of hypothermic patients with a higher average value of body temperature increase when compared to the average value of body temperature increase in the use of blanket warmers in the results of research by Rositasari et al. (2017). In the research of Awwaliyah et al. (2020), the average value of the increase in body temperature after giving fluid warmer was 1.4oC at minute 45, while in the research of Rositasari et al. (2017), the average increase in body temperature after giving blanket warmer was 1oC at minute 45. What distinguishes this study from the research of Awwaliyah et al. (2020) is that it only took 30 minutes in this study. A frequency of 1 time giving fluid warmer using lactated Ringer fluid at a dose of 50 ml/kg BW / 24 hours can increase the body temperature of respondents with an average temperature increase value of 1.78oC. In addition, the brand of fluid warmer used, the respondents' characteristics, and the research site's location also distinguish this study from Awwaliyah's research. Meanwhile, what distinguishes this study from the research of Rositasari et al. (2017) above is that in this study, the provision of blanket warmers can increase the body temperature of respondents with an average temperature increase value of 1.18oC within 30 minutes and a frequency of 1 time. In addition, the blanket warmer brand used, the respondents' characteristics, and the research site's location also distinguish this study from Rositasari's research.

From the above results, it can be concluded that there are differences in effectiveness between the use of fluid and blanket warmers in increasing the body temperature of patients with hypothermia after subarachnoid block anesthesia. The use of fluid warmers is more effective. It has a more significant effect in increasing the body temperature of patients with hypothermia after subarachnoid block anesthesia than blanket warmers. Maulana et al. (2018) say that the difference in effectiveness between the administration of fluid warmers and blanket warmers occurs because fluid warmers function internally to warm the infusion fluid and flow it directly into the body's blood vessels. Meanwhile, in the administration of blanket warmers, the warming therapy only works externally. According to researchers, the provision of fluid warmers that are more effective in raising the body temperature of hypothermic patients than the provision of blanket warmers occurs due to differences in the workings of the two tools. In the administration of fluid warmers, the warm temperature directly flows through the veins or bloodstream so that the average temperature is reached faster than the use of blanket warmers, which only work to warm the body from the outside so that in giving blanket warmers, it takes longer to warm temperature to be

distributed into the body. Giving infusion fluids warmed by fluid warmers can be used as the first warming therapy choice to increase the body temperature of hypothermic patients. This warming therapy is easy to implement and does not cause dangerous side effects. The average respondent said they were comfortable with the provision of this intervention.

CONCLUSION

There are differences in the effectiveness of fluid and blanket warmers in increasing the body temperature of hypothermic patients after subarachnoid block anesthesia, with an average increase of 0.59oC between the two groups. Of the two interventions, fluid warmers are more effective in increasing body temperature in hypothermic patients.

REFERENCES

Awwaliyah, S., Rachman, M.Z., & Ernawati, N. (2020). Pengaruh Pemberian Infus Hangat Terhadap Stabilitas Suhu Tubuh pada Pasien Post Operasi General Anestesi di Recovery Room RSU Karsa Husada Batu. *Jurnal Keperawatan Terapan (e-Journal*) *6 (01) : 38-39*

Cahyawati, Fitnaningsih Endang (2019). Pengaruh Cairan Intravena Hangat Terhadap Derajat Menggigil Pasien Post Sectio Caesarea Di RS PKU Muhammadiyah Gamping. *Jurnal Kebidanan, 8 (2) : 88*

Isngadi. I., Jaya, W., Ferdian, D. (2020). The Effect of Low-dose Granisetron on Shivering in Subarachnoid Block. *Departement of Anesthesiology and Intensive Therapy, Faculty of Medicine, Brawijaya University/Dr. Saiful Anwar, General Hospit*al *3 (3) 166-169*

Mamola, Noka Roji (2020). Hubungan Indeks Massa Tubuh Dengan Kejadian Hipotermi Pada Pasien Pasca Spinal Anestesi Di RS PKU Muhammadiyah Yogyakarta. *Jurnal Publikasi*: *Poltekkes Kemenkes Yogyakarta*

Maulana, A.E.F. (2018). Perbedaan Efektivitas Terapi Cairan Hangat dan Selimut Penghangat terhadap Perubahan Suhu Tubuh pada Pasien Pasca Operasi di Ruang Pulih Instalasi Bedah RSI Yatofa. *Prima: Jurnal Ilmiah Ilmu Kesehatan 4 (1)*

Paul, S.A., Cushing, T., Harris, N.S. (2016). *Auerbach's Wilderness Medicine Seventh Edition*. Amsterdam: Elsevier

Rositasari, S., Mulyanto, & Dyah, V. (2017). Efektifitas pemberian blanket warmer pada pasien pasca sectio caesarea yang mengalami hipotermi di RS PKU Muhammadiyah Surakarta. *Jurnal Ilmu Keperawatan Indonesia (JIKI) 10*

Sainsbury. (2017). *Manajemen Perioperatif Penatalaksanaan Pasien Bedah di Bangsal.* Jakarta: EGC

Sukarja, I.M., Mertha, I.M., Ariani, N.P.W., (2018). Penggunaan Elemen Penghangat Cairan Intravena dengan Lampu Penghangat Terhadap *Shivering* Pasca Operative. *Jurnal Gema Keperawatan 6 (1) :43-46*

Suswitha, D. (2019). Efektifitas Penggunaan *Elektric Blanket* pada Pasien yang Mengalami Hipotermi *Post* Operasi di Instalasi Bedah Sentral (IBS) Rumah Sakit Umum Daerah Palembang BARI. *Jurnal Ilmiah Kesehatan 8 (1)*

Yi, J., Lei, Y., Xu, S., Si, Y., Li,S., Xia, Z., *et al* (2017). Intraoperative hypothermia and its clinical outcome in patients undergoing general anesteshia. *National study in China. PLoS ONE, 1*.