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Comparison of Intravenous Ketamine 0.25 Mg/KgBW and Intravenous Tramadol 0.5 Mg/KgBW for Prevention of Shivering Post Spinal Anesthesia

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Abstract:-

- ***Introduction***

Shivering is one of autonom compensation mechanism to defend central temperature keep in normal limit. Based on previous studies, low dose ketamine and tramadol effectively preventing shivering after spinal anesthesia.

- ***Purpose***

This study is purposed to acknowledge the difference between tramadol 0.5 mg/BW/IV and ketamine 0.25 mg/BW/IV for prevent shivering after spinal anesthesia.

- ***Method***

This study is conducted using double blind randomized controlled trial in Haji Adam Malik Hospital and Sumatera Utara University Hospital, from February to March 2019, with 30 patient as sample for each group for being given Tramadol 0.5 mg/BW/IV and Ketamine 0.25 mg/BW/IV.

- ***Result***

From 60 patients of this study, acknowledge that more male patient is being subject in group B as 23 patients (76.7%) and more female for group A as 14 patients (46,7%). This study has compared the length of surgery between two groups as group A with the longest duration about 104.07±54.93 minutes. Besides that, shivering after ketamine 0.25 mg/BW after spinal anesthesia is higher with shivering grade 1 (33.30%) than grade 2 (23.3%), as tramadol 0.5mg/BW has more with no shivering or grade 0 than shivering. The shivering proportion difference between group A (Ketamine 0.25mg/BW/IV) and group B (tramadol 0.5 mg/BW/IV) is not statistically accepted as p (0.942)>0.05.

- ***Conclusion***

There is no difference of shivering proportion between group A (Ketamine 0.25 mg/BW/IV) and group B (Tramadol 0.5 mg/BW/IV) after spinal anesthesia.

Keyword:- *Tramadol, Ketamine, Shivering, Spinal Anesthesia.*

I. INTRODUCTION

In homeothermic species, the thermoregulation system coordinates defense against cold and heat to maintain internal body temperature, thereby optimizing physiological and metabolic functions. The combination of anesthetic-induced thermoregulation and damage by cold exposure makes surgical patients experience hypothermia (Webb *et al*,1981).

Shivering is one of the complications that often occur in postoperative patients. A 45% incidence can occur after the administration of anesthesia even though the patient kept warmth during surgery. Shivering shortly after the anesthesia can occur because the anesthetic drugs can inhibit the thermoregulation center so that there is a change in the body's thermoregulatory mechanism to decrease the body's core temperature in the form of shivering (English W., 2002).

The incidence of perioperative shivering increases at extreme ages. Exposure of the body to the operating room with a cold environment, administering ice-cold intravenous fluids or blood transfusions with the temperature of the operating room that is not warmed before, and during and after regional anesthesia were around 40-60% of reported cases (English W., 2002).

Shivering causes detrimental physiological effects, such as peripheral vasoconstriction, compensation for oxygen demand which increases up to 5 times, increases carbon dioxide, decreases oxygen saturation, decreases drug metabolism, interferes with formation of clotting factors, decreases immune response, causes impaired healing, decreases immune response, causes impaired wound healing, and increases protein breakdown and cardiac ischemia (English W., 2002)

The hypothermia that occurs after spinal anesthesia is due to the effects of vasodilation under the block area and the redistribution of body heat from the peripheral core and the restriction of shivering to the muscle mass above the block area. The height of the spinal block achieved is

directly related to the patient threshold of shivering so that the higher the block is produced the lower the threshold of shivering in the patient. Perioperative hypothermia is defined as the core temperature, 33℃ to 35℃, while the threshold shivering in the patient who is not sedated is 35.5℃ (English, 2002).

Shivering is one of the autonomic compensation to maintain a central temperature under normal conditions. At the time of shivering, there is an increase in sympathetic stimulation in the body resulting in an increase in the concentration of catecholamines in the plasma circulation. Increased catecholamine alone will increase blood pressure, pulse rate, and cardiac output. The main risk that occurs in shivering is an increase in metabolic processes (up to 400%) and it aggravates postoperative pain. Increased muscle activity will also increase oxygen demand and carbon dioxide production. This will be dangerous for patients with premorbid cardiovascular disease and for the respiratory systems (Talakoub, 2006)

Post Anesthetic Shivering (PAS) occurs in 40-60% of patients after inhalation anesthesia, 5-65% of patients undergoing general anesthesia and approximately 33-56.7% of patients with regional anesthesia. Research conducted by Yimer et al of the 203 patients who underwent general anesthesia and spinal anesthesia found that 26% of them experienced shivering, of which 25 patients experienced level II shivering and 6 patients experienced level III shivering. Some studies of drugs to prevent the occurrence of shivering in postoperative patients have been carried out such as the administration of tramadol, fentanyl, ketamine, ondansetron, pethidine (Yimer, 2015).

Lema et al. Said in their study that there were differences in the incidence of shivering associated with blocked sensory height. The higher the sensory level is blocked the greater the body's heat loss (Lema et al, 2017). Spinal anesthesia is significantly related to the thermoregulation system by means of vasoconstriction which plays an important role in temperature regulation. Spinal anesthesia also causes redistribution from the central body temperature to the periphery. These two effects affect the incidence of hypothermia and shivering. The average patient who shivered with spinal anesthesia was observed 55% in 21 studies (Usta, 2011)

The study concerning tramadol use was also carried out by Seifi et al. Who compared tramadol 1 mg/kg and pethidine 0.5 mg/kg to 60 patients who underwent surgery, the results showed no significant difference in which 16 out of 30 patients given pethidine (53.3%) did not experience postoperative shivering and 20 of 30 patients given tramadol (66.66%) also did not experience postoperative shivering (Seifi, 2007)

Research on ketamine was carried out by Lakhe et al. who compared Tramadol, Ketamine, and Ondansetron to 120 patients given Ondansetron 4 mg, Ketamine 0.25 mg/Kg and Tramadol 0.5 mg/kg. The results showed that low doses of ketamine and tramadol are effective in preventing shivering after spinal anesthesia (Lakhe, 2017). Research on the comparison of tramadol and ketamine has been carried out by Lema et al. Comparing tramadol 0.5 mg/kg and ketamine 0.2 mg/kg for 123 patients, found the results that there was no difference in the administration of the two drugs in which with tramadol 9 patients experienced shivering (22%) and with ketamine 8 patients experienced shivering (19.5) (Lema, 2017).

The number of side effects caused by shivering post spinal anesthesia and the limited research on the effectiveness of Tramadol and Ketamine in preventing shivering post spinal anesthesia has made the researchers to use Tramadol 0.5 mg/kgBW/IV and Ketamine 0.25 mg/kg/IV.

II. RESEARCH METHODS

A. Research Design

This study used a double-blind randomized controlled clinical trial to determine the comparison of intravenous Ketamine 0.25 mg/KgBW and intravenous Tramadol 0.5 mg/kgBW as prevention of shivering post spinal anesthesia.

B. Place and Time

H. Adam Malik Central General Hospital, Medan, USU Hospital and Putri Hijau grade II Hospital, Medan. The study was conducted in February 2019 until March 2019

C. Research Population and Samples

The study population was patients with spinal anesthesia at the H. Adam Malik Central General Hospital, Medan, USU Hospital and Putri Hijau grade II Hospital, Medan. The study samples were patients underwent spinal anesthesia and surgery at the H. Adam Malik Central General Hospital, Medan, USU Hospital and Putri Hijau grade II Hospital, Medan. The technique of getting samples was by consecutive sampling which was to find patients who meet the inclusion and exclusion criteria until they filled the number of samples needed. After being calculated statistically, all samples were divided into 2 groups, the intravenous Ketamine 0.25 mg/kgBW group and the intravenous Tramadol 0.5 mg/kgBW group..

D. Inclusion and Exclusion Criteria

The inclusion criteria were 18-64 years old, ASA PS 1-2, Th 8 block height. The exclusion criteria were having a history of hypersensitivity to ketamine and tramadol, patients who had preoperative hypothermia or hyperthermia, patients were receiving ketamine and tramadol treatment in 24 hours, patients were suffering from epilepsy, hypertension, cerebral vascular disease, increased intracranial pressure, kidney failure and psychiatric disorders, patients with a history of thyroid disease, patients with a history of cardiopulmonary disease. The drop Out Criteria were if the operation lasts more than 2 hours, Spinal anesthesia fails or changes to general anesthesia, patients requiring transfusion.

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E. Sample Size

According to the research hypothesis, the sample size was calculated by the sample size formula for hypothesis testing in the proportion of 2 or more populations. The incidence of postoperative shivering in the Tramadol group was 65% (P1 = 0.65) whereas in the group receiving Ketamine 0.25/KgBW it was estimated to be 15% (P2 = 0.15), then q1 = 1-0.65=0.35 and Q2 =1.0, 15=0.85, Zα value=1.96 (type I error I or α=0.05) and Zβ=0.842 (type II error or β=0.2, 95% research power) then the sample size was

$$n^1 = n^2 = \frac{(Z\alpha\sqrt{2PQ} + Z\beta\sqrt{P_1\ Q_1 + P_2\ Q_2})^2}{(P_1 - P_2)^2}$$

- n1 = the number of subjects given ketamine
- n2 = the number of subjects given tramadol
- α = type 1 error, set at 5%
- β = type 2 error, set at 20%
- P2 = the proportion of shivering on tramadol based on the literature is 16%
- Q2 = 1 – P2 = 1 – 16% = 84%
- P1 – P2 = The minimum difference in the proportion of events that are considered significant between ketamine and tramadol, set at 5%
- P1 = The proportion of incidence in ketamine set at → (P1-P2) + P2 → 10%
- Q1 = 1-P = 90%
- P = (P1+ P2)/2 = 13%
- Q = 1-P → 87%
- $\frac{(1{,}96\ \sqrt{2x0{,}13x\ 0{,}87} + 0{,}84\ \sqrt{0{,}1\ x\ 0{,}9 + 0{,}16\ x\ 0{,}84})^2}{0{,}05}$ = $\frac{(0{,}9159 + 0{,}3864\ )^2}{0{,}05}$ = 26 / Group

To anticipate a drop out, 10% of the number of samples needed was added. So that the number of samples needed was 29 samples per group

F. Informed Consent

After obtaining approval from the Ethics Committee, patients got an explanation of the procedures and stated in writing their willingness on the informed consent sheet.

G. Procedures

The selection of the patients was performed on patients who would undergo elective surgery under spinal anesthesia based on predetermined criteria. Patients were given an explanation of the things that would be done, and were willing to take part in the research and filled out informed consent.

1. All patients were given Lactate Ringer fluid 10 ml/kgBW/hour which was stored at room temperature 20 minutes before surgery.
2. When entering the operating room, systolic blood pressure (TDS), diastolic blood pressure (TDD), Frequency of Heart Rate (FJ), oxygen saturation (SaO2) and body temperature were measured 5 minutes before spinal anesthesia was performed.
3. The researcher took the envelope prepared by the volunteers without knowing the contents of the envelope.
4. In the Ketamine group, intravenous Ketamine 0.25mg/KgBW was administered which diluted with 0.9% NaCl to 10 ml volume after administration of spinal anesthesia. In the Tramadol group, intravenous Tramadol 0.5 mg/KgBW was administered which diluted with 0.9% NaCl to 10 ml volume after spinal anesthesia.
5. During the operation, the fluid maintenance was using Lactate Ringer fluid 2 ml/kgBW/hour with the room temperature maintained between 23-25 degrees Celsius during surgery and the recovery every 5 minutes. During the operation, the researchers recorded the incidence of shivering and measured systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), oxygen saturation (SaO2) and body temperature.
6. If the incidence of shivering occurred, the treatment was considered ineffective and the patient is given intravenous pethidine 25 mg, if the drug was not available, the patient would be covered and given intravenous fluid that had been warmed. The decrease in arterial pressure on average more than 20% of the initial value treated with intravenous ephedrine 5-10 mg. If bradycardia with heart rate <50 times/minute occurred, atropine 0.5 mg iv was administered. If there was an effect of nausea and vomiting, Ondansetron 4 mg was administered.
7. At the end of the surgery, the maintenance solution was stopped. The patient was then transferred to the recovery room and given nasal cannula oxygen 3 lpm.
8. Every 10 minutes in the recovery room, the researchers recorded the incidence, shivering, systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), oxygen saturation (SaO2) and body temperature. If the incidence of shivering occurred, the treatment was considered ineffective and the patient is given intravenous pethidine 25 mg, if the drug was not available, the patient would be covered and given intravenous fluid that had been warmed. The decrease in arterial pressure on average more than 20% of the initial value treated with intravenous ephedrine 5-10 mg. If bradycardia with heart rate <50 times/minute occurred, atropine 0.5 mg iv was administered. If there was an effect of nausea and vomiting, intravenous Ondansetron 4 mg was administered. The patient was monitored for up to 2 hours after the surgery.
9. The collected data was processed and analyzed statistically using the Windows statistical product and service solution (SPSS) program. For numerical data, it was presented in mean ± standard deviation, and the statistical test was conducted to compare if it was significant or statistically significant.

H. Data Management and Analysis Plans

- Analyzing the data collected using the SPSS software program.
- Analyzing grouped shivering data, axilla temperature, nausea and vomiting if the distribution was normal with

the unpaired t-test, whereas if the distribution was not normal with the chi-square test.
- The level of significance was set at 5%.
- The confidence interval used was 95%.

I. Ethical Issues

This research was conducted after obtaining permission from the research ethics committees in the Medical Faculty, North Sumatera University, Haji Adam Malik General Central Hospital, Medan, USU Hospital and Putri Hijau grade II Hospital, Medan. The patient was previously given an explanation of the purpose, benefits and risks and other things related to the study. Then they were asked to fill out an informed consent form to state their willingness to be the subject of the study. The actions taken in this study were the usual actions performed on patients and before the anesthesia and the research process began, the emergency equipment had been prepared (nasopharyngeal airway, Ambu bag, oxygen, laryngoscope, patient-size endotracheal tube, suction set) , monitor (pulse oximetry, blood pressure, ECG, heart rate), emergency medicine (ephedrine, adrenaline, atropine sulfate, lidocaine, aminophylline, dexamethasone, naloxone). If there was an emergency in the airway, heart, lung, and brain during the research process, then the anticipation and handling procedures were carried out in accordance with standard techniques, tools, and drugs as previously prepared.

III. RESULTS

A. Sample Characteristics

This research was carried out for 6 weeks at Haji Adam Malik Hospital in Medan, University of North Sumatra (USU) Hospital, and Putri Hijau grade II Hospital, Medan. This study aims to determine the differences in the effectiveness of giving Tramadol 0.5 mg/kgBW/IV and Ketamine 0.25 mg/kgBW/IV as the prevention of shivering post spinal anesthesia

Characteristic			Observation		Total	P value
			Patient A	Patient B		
Sex	Male	N	16	23	39	0.104
		%	53.3%	76.7%	65.0%	
	Female	N	14	7	21	
		%	46.7%	23.3%	35.0%	
Case	Surgery	N	1	4	5	0.235
		%	3.3%	13.3%	8.3%	
	Digestive	N	3	4	7	
		%	10.0%	13.3%	11.7%	
	Obgin	N	6	2	8	
		%	20.0%	6.7%	13.3%	
	Orthopedic	N	11	7	18	
		%	36.7%	23.3%	30.0%	
	Urology	N	9	13	22	
		%	30.0%	43.3%	36.7%	
ASA	I	N	14	15	29	1.000
		%	46.7%	50.0%	48.3%	
	II	N	16	15	31	
		%	53.3%	50.0%	51.7%	
Total		N	30	30	60	
		%	100.0%	100.0%	100.0%	

Table 1:- Sample Characteristics

The samples obtained in this study amounted to 60 samples that were in accordance with the inclusion and exclusion criteria, with 30 samples of treatment group A (intravenous Ketamine 0.25 mg/kgBW/) and 30 samples of the treatment group B (intravenous tramadol 0.5 mg/kg). Table 1 shows the distribution of respondents based on characteristics. Males in group A were 16 respondents (53.3%) and in group B were 23 respondents (76.7%) while females in group A were 14 respondents (46.7%) and in group B were 7 respondents (23.3 %). In addition, the sample in this study came mostly from urological cases of 22 samples (36.7%). And based on the ASA PS group, the most samples were ASA PS II, which were 31 samples (51.7%). Statistically, the research data based on demographic characteristics of the data were homogeneous with p value > 0.05.

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Observation	Group A		Group A		P value
	Mean	SD	Mean	SD	
Age	46.43	15.40	47.27	16.65	0.841
Duration	104.07	54.93	99.33	47.48	0.728

Table 2:- Age and Duration of surgery characteristics

Based on Table 2., the mean age in this study was higher in Tramadol patients Group with a mean of 47.27±16.65 years old although statistically there were no significant differences in the data with a p value > 0.05 (0.841). This study also compared the duration of the surgery in both groups, with the longest duration of operation obtained in group A around 104.07±54.93 minutes

The percentage of age in the groups of this study group were also presented in graphical form (Figure 1).

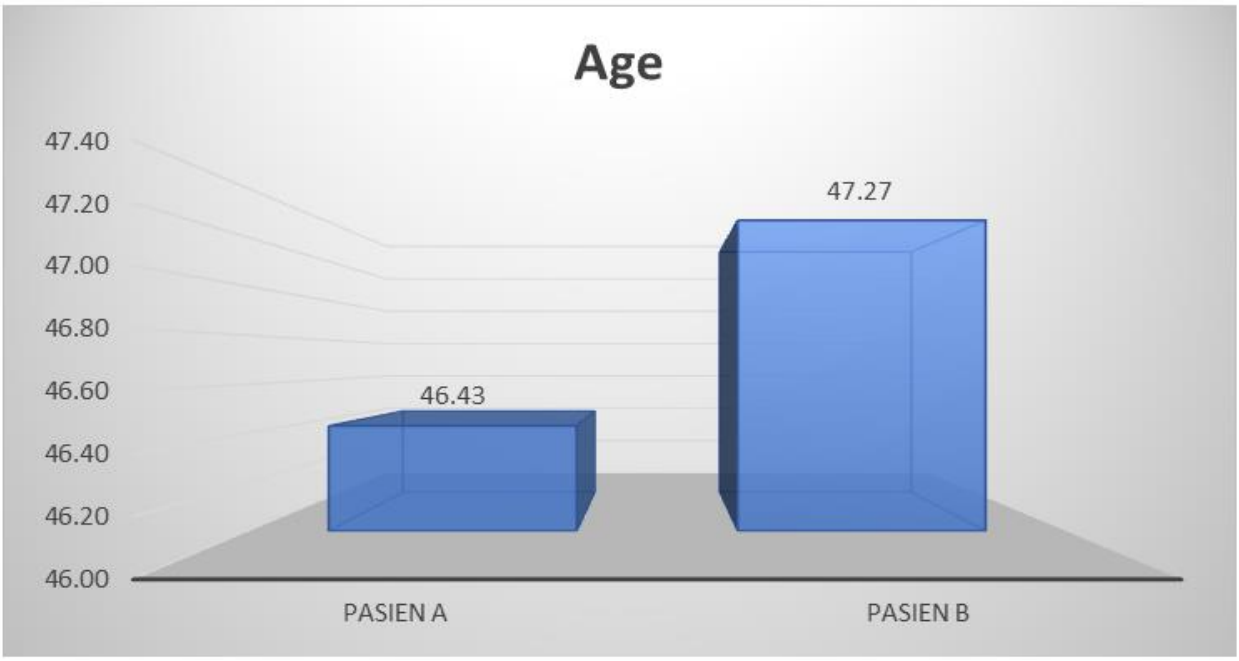

Fig 1:- Overview of age in group A and group B

Based on Figure 1 it was found that group B had a higher mean of age than group A.

Monitoring	Starting the surgery Operation (Mean)			During the surgery Operation (Mean)			The end of the surgery Operation Operasi (Mean)		
	Group A	Group B	P Value	Group A	Group B	P Value	Group A	Group B	P Value
MAP	89,89	94,1	0,092	82,68	87,2	0,139	84,17	91,4	0,287
HR	79,24	80,0	0,504	79,93	76,5	0,371	76,14	74,8	0,089
RR	18,1	18,0	0,591	17,76	18	0,528	18,14	18	0,538
Temp	35,54	36,7	0,339	35,51	36,7	0,061	35,59	36,6	0,077
SpO2	97,58	97,99	0,448	96,87	97,36	0,276	97,34	97,49	0,359

Table 3:- Overview of the Hemodynamic characteristics of Group A and B

From table 3. it can be seen the hemodynamic comparison at the start of surgery, during surgery and the end of surgery, there were the Mean Arterial Pressure (MAP), heart rate, breathing frequency, temperature, and oxygen saturation. Statistically, there were no significant differences between the two groups (p> 0.05).

B. The overview of the incidence of shivering after the administration of ketamine 0.25mg/kgBW post spinal anesthesia

The overview of the incidence of shivering after the administration of ketamine 0.25mg/kgBW post spinal anesthesia was shown in table 4.

Treatment A (intravenous Ketamine 0.25 mg/kgBW)	Observation	
	N	%
0	13	43.3
1	10	33.3
2	7	23.3

Table 4:- The overview of the incidence of shivering after the administration of ketamine 0.25mg/kgBW post spinal anesthesia

Based on table 4. it was found that the incidence of shivering after the administration of Ketamine 0.25 mg/kg

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post spinal anesthesia was more likely to occur in 1st degree shivering (33.30%) compared to the 2nd degree shivering (23.3%)

C. The overview of the incidence of shivering after the administration of tramadol 0.5 mg/kgBW post spinal anesthesia

The overview of the incidence of shivering after the administration of tramadol 0.5 mg/kgBW post spinal anesthesia was shown in table 5.

Shivering incidence in Patient B (intravenous tramadol 0.5 mg/kgBW))	**Observation**	
	N	**%**
0	13	43.3
1	9	30.0
2	8	26.7

Table 5:- The overview of the incidence of shivering after the administration of tramadol 0.5 mg/kgBW post spinal anesthesia

Based on Table 5. it was found that the incidence of shivering after tramadol 0.5mg/kgBW administration post spinal anesthesia was more likely to occur in first degree shivering (30.0%) compared to second degree shivering (26.7%). However, in the whole sample, it was found that the occurrence of not shivering with 0th degrees was more than the incidence of shivering (1st and 2nd degrees).

Group A	Group B	P Value
35,83	35,71	0,313

Table 6:- The mean of temperature difference in samples in shivering incidence between 2 groups

From the table above, it can be seen that the comparison of the mean temperature of the samples in shivering incidence between 2 groups found that there was no significant difference with p value > 0.05.

D. Comparison of the shivering incidence after the administration of tramadol 0.5mg/kgBW and Ketamin 0.25mg/kgBW post spinal anesthesia

Comparison of the shivering incidence after the administration of tramadol 0.5mg/kgBW and Ketamin 0.25mg/kgBW post spinal anesthesia was shown in pada Table 7.

Shivering incidence		Observation		Total	P value
		Patient A	Patient B		
0	N	13	13	26	0.942
	%	43.3	43.3	43.3	
1	N	10	9	19	
	%	33.3	30.0	31.7	
2	N	7	8	15	
	%	23.3	26.7	25.0	

Table 7:- Comparison of the shivering incidence after the administration of tramadol 0.5mg/kgBW and Ketamin 0.25mg/kgBW post spinal anesthesia

Table 8. shows the difference in shivering proportions between group A and group B. In group A, the highest proportion was with score 0 with 13 respondents (43.3%) and the lowest proportion was in score 2 with 7 respondents (23.3%). Whereas in group B, the highest proportion was in score 0 with 13 respondents (43.3%) and the lowest was in score 2 with 8 respondents (26.7%). From the results of statistical tests, p value (0.942) > 0.05, which means there was no difference in the shivering proportion between group A and group B.

E. Comparison of the shivering onset after the administration of tramadol 0.5mg/kgBW and Ketamin 0.25mg/kgBW post spinal anesthesia

Comparison of the shivering onset after the administration of tramadol 0.5mg/kgBW and Ketamin 0.25mg/kgBW post spinal anesthesia was shown in Table 8.

Group	**Mean**	**SD**	**P value**
Ketamin	26.44	19.708	0.839
Tramadol	25.33	13.425	
* Mann Whitney test			

Table 8:- Comparison of the shivering onset after the administration of tramadol 0.5mg/kgBW and Ketamin 0.25mg/kgBW post spinal anesthesia

Table 8. shows that the mean time of shivering onset in the Ketamin group was at 26.44 minutes and in the Tramadol group the mean value was at 25.33 minutes, from the statistical test results, p value (0.839) > 0.05 which means there was no difference in the onset of shivering between the Ketamin group and the Tramadol group.

IV. DISCUSSION

This study was conducted to determine the differences in the effectiveness of tramadol 0.5 mg/kgBW/IV and ketamine 0.25 mg/kgBW/IV as prevention of shivering post spinal anesthesia with a double-blind randomized controlled clinical trial. This study used the data obtained directly from patients undergoing spinal anesthesia at the Haji Adam Malik Hospital in Medan. Observation of the shivering incidence was carried out after spinal action until 2 hours after the surgery. This study was an analytical study with 60 research samples.

Based on Table 2, it was found that the tramadol group had the oldest mean age although there were no significant differences in the data. The difference in the Ketamine and Tramadol groups was also assessed by the time of the tramadol and ketamine onset, in which the Ketamine group had a longer onset compared to the Tramadol group but the difference was not significant. This is in accordance with research conducted by Lema et. al (2017).

Table 3 shows that hemodynamics in both groups was stable. On observing the temperature when compared to the mean values at the beginning, during, and end of surgery, the results of the measurements can be seen in theory that the inhibition caused by neuraxial anesthesia from the thermoregulation mechanism will result in perioperative hypothermia. Perioperative shivering occurs as a thermoregulatory response to hypothermia (Ameta et. al, 2018).

Shivering is an unpleasant phenomenon that can occur during the perioperative period. Shivering has several destructive physiological effects, such as increasing SVR, left shifting saturation curve of Hb oxygen, changing mental status, causing impaired renal function, delaying drug metabolism, causing impaired wound healing, and increasing the risk of infection. Perioperative shivering can increase oxygen consumption by as much as five-fold and can reduce arterial oxygen saturation and may be associated with increased myocardial ischemia (Azam et. Al., 2018). In this study, relative hemodynamics was found to be stable in both groups. This is not in accordance with Azam et. al (2018) who concluded that the use of low-dose intravenous prophylaxis of Ketamine 0.5 mg/kg was significantly more effective than intravenous tramadol in the prevention of shivering during spinal anesthesia in women undergoing cesarean section.

Based on table 4, it was found that the incidence of shivering after the administration of Ketamine 0.25 mg/kg post spinal anesthesia occurred mostly in 1st degree of shivering, this is in accordance with the research conducted by Hussain et. al. (2017) that ketamine shows an anti-shivering effect on comparative research with a sample of 120 people (Husein et. Al., 2017). Theoretically, ketamine, a competitive N-methyl-d-aspartate (NMDA) receptor antagonist, plays a role in thermoregulation at various process levels. The NMDA receptor modulates noradrenergic and serotoninergic neurons at the locus coeruleus. It is used as an anti-shivering agent in the range of 0.5 - 0.75 mg/kg intravenous dose (Hasannasab et. al., 2016).

Based on Table 5, it was found that the incidence of shivering after tramadol 0.5mg/kgBW administration post spinal anesthesia was also higher in 1st degree shivering, but in the whole sample, it was found that the incidence of shivering was higher in 0 than the shivering incidence (1st and 2nd degrees). This is in accordance with the research conducted by Ku et. al. (2012) that the degree of shivering in patients given tramadol treatment was mostly in the 1st degree shivering (12.9%) whereas in the second degree shivering in the tramadol group was not found. Ku et. al. found that the overall incidence of shivering was low (15%) compared to the reported incidents in 12 other studies with 40-60% (Ku et. al., 2012)

According to the research by Lema et. al. (2017), they found that ketamine as an anti-shivering effect had the highest percentage of 2nd degree shivering. The results of this study were different, because, in this study, most incidences were classified as 1st degree shivering (Lema et. Al., 2017). However, when viewed from the onset of tramadol as an anti-shivering, there was a different result in which the onset of shivering in this study is longer than the onset of shivering presented by Azam et. al. (2018) who found that in tramadol, the incidence of shivering mostly occurred for 15-20 minutes. In 30 minutes, most of the shivering episodes were saved with a dose of tramadol rescue. There were no cases of repeated shivering after the administration of tramadol.

Based on Table 8, it shows the difference in shivering proportions between group A and group B. In group A, the highest proportion was in score 0 with 13 respondents (43.3%) and the lowest proportion in score 2 with 7 respondents (23.3%). Whereas in group B, the highest proportion was in score 0 with 13 respondents (43.3%) and the lowest was in score 2 with 8 respondents (26.7%). From the results of statistical tests, p value (0.942) > 0.05, which means there was no difference in the proportion of shivering between group A and group B. This shows that the percentage of group B is better than group A. This is in accordance with the previous theory that various treatments such as intravenous fluid heating, application of radiation heat, controlling operating room temperature or pharmacological agents such as ketamine and tramodol have been used to control intraoperative shivering to avoid the bad consequences of shivering.

This is not in accordance with the results of research conducted by Lema et al. According to research conducted by Lema et. al. (2017), it was found that there were many patients with second degree shivering in the group given ketamine with 31.7% and tramadol with 22%. This is because the block height setting also affects the intensity of the shivering incidence.

V. CONCLUSIONS

The incidence of shivering after the administration of Ketamine 0.25 mg/kg post spinal anesthesia mostly occurs in 1st degree shivering. The incidence of shivering after tramadol 0.5mg/kgBW administration post spinal anesthesia is also more likely to occur in 1st degree. There is no difference in the proportion of shivering between group A (intravenous Ketamine 0.25 mg/kgBW) and group B (intravenous tramadol 0.5 mg/kg) with p value (0.942) > 0.05.

SUGGESTIONS

It is hoped that further research can be carried out with a larger sample. This research is expected to be a theoretical basis for assessing the effects of ketamine and tramadol as anti-shivering. Further research is expected to be done using a comparison control group or placebo. And the next research can be done on research subjects who underwent the same surgery.

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