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Effectiveness Between Petidine And Tramadol 50 Mg To Overcome Shivering In Patients Sc With Spinal Anesthesia

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ABSTRAK

Background: One of the anesthetic techniques that is often used in SC surgery is regional/spinal anesthesia. Shivering is the body's compensatory mechanism for hypothermia. The standard drugs used for shivering are petidine and tramadol. The aim was to compare the effectiveness of petidine with 50 mg tramadol to treat shivering in SC patients with spinal anesthesia at RSIA Lenggogeni Padang. Research Method: Quantitative method double blind randomized controlled clinical trial. The number of samples was 32, 16 people in the Petidine group and 16 people in the Tramadol group, using a purposive sampling technique. The instrument uses an observation sheet. Univariate and bivariate data analysis using the Mann Whitney U Test. Results of the study: Giving petidine showed that most of the respondents experienced grade 3 shivering (50.0%), and tramadol administration showed that most of the respondents experienced grade 4 shivering (37.5%). The mean value of the petidine group (16.66) was greater than the mean value of the 50 mg tramadol group (16.34). Conclusion: Giving petidine is more effective than giving tramadol 50 mg to treat shivering in SC patients with spinal anesthesia.

Keywords: *Petidine*, *Tramadol*, *Shivering*, *Spinal Anesthesia*

INTRODUCTION

Cesarean section is the act of delivering a baby by way of surgery on the abdominal wall and the mother's uterus. According to the World Health Organization (WHO), the standard rate of Sectio Caesarea (SC) is around 5-15%. WHO data in the Global Survey on Maternal and Perinatal Health in 2011 showed that 46.1% of all births were performed through Sectio Caesarea (SC) (WHO, 2019). Based on RISKESDAS data in 2018, the number of deliveries using the Sectio Caesarea (SC) method in Indonesia was 17.6%.

Advances in anesthesia, operative techniques, administration of intravenous fluids and transfusions, and the increasing role of antibiotics have reduced maternal mortality due to bleeding and infection. Some of the factors for sectio caesarea surgery to be performed under anesthesia are the indication for

surgery, urgency, patient preference, obstetrician and anesthesiology skills. Regional anesthesia has become the preferred technique over general anesthesia which has a greater risk of maternal morbidity and mortality. The advantages of regional anesthesia are minimal exposure to depressant drugs in the neonate, decreased risk of pulmonary aspiration in the mother and the mother can remain awake when her child is born (Wahyuni, 2021).

There are 3 types of anesthesia: local anesthesia, general anesthesia, and regional anesthesia. One of the anesthesia techniques often used in SC surgery is regional/spinal anesthesia (Subarachnoid Block). Spinal anesthesia is the injection of local anesthetic drugs into the subarachnoid space in the area between the lumbar vertebrae L2-L3 or L3-L4 or L4-L5 (Oroh, Yudono, and Siwi 2022). Spinal anesthesia can have complications, namely major complications and minor complications. Major complications are local anesthetic drug allergy, transient neurologic syndrome, nerve injury, subarhacnoid hemorrhage, infection, total spinal anesthesia, respiratory failure, equine cauda syndrome, and other neurological dysfunctions. Minor complications include hypotension, Post Operative Nausea Vomiting, shivering (shivering) (post puncture headache, decreased hearing, anxiety, etc.) (Wijayanto et al., 2012).

Shivering is the body's compensatory mechanism against hypothermia (Rositasari, 2017). The incidence of shivering after regional anesthesia in sectio caesaria (SC) is 85%. The incidence of shivering that occurs after epidural anesthesia ranges from 30%-33%. The incidence of post spinal anesthesia shivering is between 50%-80%. The incidence of Post Anesthetic Shivering (PAS) in patients undergoing spinal anesthesia is between 33%-56.7% (Winarni, 2020).

Non-pharmacologic treatments for shivering include maintaining the operating room temperature in a normothermic state, warming the intravenous fluids, and using warm covering clothing. However, non-pharmacologic prevention does not show promising effects, so pharmacologic treatment proves to be more effective (Luggya et al., 2016).

The standard drug used for shivering events is petidine. Petidine is a μ and κ opioid receptor agonist with higher affinity for κ receptors and is effective as a treatment for shivering at a minimum dose of 0.35 mg/kgBB (Shami et al., 2016). Petidine may cause side effects such as excessive sedation, respiratory depression, nausea and vomiting, itching, constipation, and post-operative hyperalgesia. Therefore, other drugs are needed that can prevent the incidence of shivering with minimal side effects. Some other drugs that have been used to reduce the incidence of post-anesthesia shivering include alfentanil, dexmetomidine, magnesium sulfate, dolasetron as well as ondansetron and tramadol.

Tramadol in a meta-analysis involving 16 randomized controlled trials (RCTs) was found to be effective in reducing the incidence and severity of post-operative shivering, as well as the use of rescue drugs. Tramadol has been widely used as an analgesic drug for postoperative pain and labor without causing harmful side effects for the mother and baby. Tramadol has agonistic effects on opioid receptors, especially on μ (mu) receptors, with minimal effects on κ

(kappa) and σ (sigma) receptors. Tramadol activates monoaminergic receptors and inhibits the synaptosomal uptake of noradrenaline and serotonin, resulting in analgesia, and is also effective in preventing postanesthesia shivering (Mayestika and Hasmira 2021).

Research conducted by (Lakhe et al. 2017), The results showed that the lowest incidence of shivering was obtained in the ketamine (10%) and tramadol (10%) groups compared to the ondansetron group (16.7%) and the NS group (56.7%). The difference between groups was significant when compared to the NS group. The longest onset of shivering was obtained in the ondansetron group (21±1.15) followed by the ketamine group (18.33±2.88), tramadol (16.67±10.41), and NS (13±9.62). The difference between groups was significant when compared to the NS group. Mild and moderate sedation were more common in the tramadol group (30% and 6.67%) compared to the ketamine group (20% and 3.33%). The difference between groups was significant when compared to the NS and ondansetron groups.

Based on preliminary studies at RSIA Lenggogeni Padang obtained data for the last 3 months from December to February 2023, it was found that the incidence of shivering was still quite high, this was evidenced by data that 5 out of 10 patients (50%) who underwent surgery using spinal anesthesia techniques experienced shivering.

The number of side effects caused by shivering after spinal anesthesia and the limited research on the effectiveness of petidine and tramadol in preventing shivering after spinal anesthesia, so researchers are interested in conducting research on "Effectiveness Between Petidine and Tramadol 50 mg to Overcome Shivering in SC Patients with Spinal Anesthesia". The researcher took the title of this study because the researcher wanted to know the comparison of the administration of petidine with tramadol 50 mg in SC patients who experienced shivering after spinal anesthesia which was more effective given to patients at RSIA Lenggogeni Padang.

The purpose of this study was to compare the effectiveness between petidine and tramadol 50 mg to overcome shivering in SC patients with spinal anesthesia at RSIA Lenggogeni Padang.

METODOLOGI

This research is quantitative using a double blind randomized controlledclinical trial. This research was conducted at RSIA Lenggogeni Padang in February - May 2023. The number of samples in this study amounted to 32 people divided into 2 groups, namely the Petidine group 16 people and the Tramadol group 16 people. Using purposive sampling technique with sample criteria including patient age 20 - 40 years, spinal anesthesia drugs used are hyperbaric, length of surgery 1 - 2 hours, body weight in accordance with normal BMI (Body Mass Index) (BMI is divided into 3 groups namely 18.5 20.0, 20.1-22.5, 22.6-25.0), operating room temperature is always maintained cold (19-24^{o}C), intravenous fluids must be warmed to a temperature of 37 ℃. This research instrument used an observation sheet. Data collection techniques using

observation and documentation. Data analysis used univariate analysis in the form of frequency descriptions and bivariate analysis with the Mann Whitney U Test.

HASIL DAN PEMBAHASAN

Results

a. Research Results Univariate Analysis

Table 4. 1 Frequency Distribution Based on Age of SC patients with Spinal Anesthesia at Lenggogeni Hospital Padang

Age	Petidine		Tramadol 50 mg		Total	
	f	%	f	%	f	%
20-25	3	9,4	4	12,5	7	21,9
year	3	9,4	1	3,1	4	12,5
26-30	3	9,4	5	15,6	8	25,0
year	7	21,8	6	18,8	13	40,6
31-35 year						
36-40 year						
Total	**16**	**50**	**16**	**50**	**32**	**100**

Source: Primary Data, 2023

Based on table 4.1, the results of 32 respondents, it can be seen that most of the respondents were between 36-40 years old from both the petidine group and the tramadol 50 mg group as many as 13 people (40.6%), namely the petidine group was mostly between 36-40 years old as many as 7 people (21.8%) while the tramadol 50 mg group was mostly between 36-40 years old as many as 6 people (18.8%).

Table 4. 2 Frequency Distribution Based on Length of Operation of SC Patients with Spinal Anesthesia at Lenggogeni Hospital Padang

Length of Operation	Petidine		Tramadol 50 mg		Total	
	f	%	f	%	f	%
1 Hour	13	40,6	10	31,3	23	71,9
2 Hour	3	9,4	6	18,7	9	28,1
Total	**16**	**50**	**16**	**50**	**32**	**100**

Source: Primary Data, 2023

Based on table 4.2, the results of 32 respondents, it can be seen that most of the respondents' operation time was 1 hour both from the petidine group and the tramadol 50 mg group as many as 23 people (71.9%), namely the petidine group most of the respondents' operation time was 1 hour as many as 13 people (40.6%) while the tramadol 50 mg group most of the respondents' operation time was 1 hour as many as 10 (31.3%).

Table 4. 3 Frequency Distribution Based on BMI of SC Patients with Spinal Anesthesia at Lenggogeni Hospital Padang

IMT	*Shivering*												Total	
	Petidine						Tramadol 50 mg							
	0	1	2	3	4	Jml	0	1	2	3	4	Jml	f	%
18,5-20,0	0	0	0	3	1	4	0	0	0	0	2	2	6	18,8
20,1-22,5	0	0	0	1	4	5	0	0	0	2	2	4	9	28,1
22,6-25,0	1	1	1	4	0	7	1	1	1	6	1	10	17	53,1
Total	**1**	**1**	**1**	**8**	**5**	**16**	**1**	**1**	**1**	**8**	**5**	**16**	**32**	**100**

Source: Primary Data, 2023

Based on table 4.3 obtained results from 32 respondents, it can be seen that the petidine group with BMI 18.5-20.0 occurred *shivering* degree 3 as many as 3 people and degree 4 as many as 1 person, BMI 20.1-22.5 occurred *shivering* degree 3 as many as 1 person and degree 4 as many as 4 people, BMI 22.6-25.0 occurred shivering degree 0-2 each 1 person and degree 3 as many as 4 people. The tramadol group with BMI 18.5-20.0 occurred *shivering* of degree 4 of 2 people, BMI 20.1-22.5 occurred *shivering* of degree 3 of 2 people and degree 4 of 2 people, BMI 22.6-25.0 occurred *shivering* of degree 0-2 of 1 person each, degree 3 of 6 people and degree 4 of 1 person.

Table 4. 4 Frequency Distribution Based on the Incidence of Shivering in the Petidine Group at Lenggogeni Hospital Padang

Shivering Event Petidine Group	f	%
0	1	6,3
1	1	6,3
2	1	6,3
3	8	50,0
4	5	31,2
Total	**16**	**100**

Source: Primary Data, 2023

Based on table 4.4, the administration of petidine to overcome *shivering* in SC patients with spinal anesthesia, the results of 16 respondents showed that most respondents experienced grade 3 *shivering*, totaling 8 people (50.0%).

Table 4. 5 Frequency Distribution Based on the Incidence of Shivering in the Petidine Group at Lenggogeni Hospital Padang

Incidence of Shivering Tramadol 50 mg group	f	%
0	1	6,3
1	1	6,3
2	3	18,8
3	5	31,2
4	6	37,5
Total	**16**	**100**

Source: Primary Data, 2023

Based on table 4.5, the administration of tramadol 50 mg to overcome *shivering* in SC patients with spinal anesthesia obtained the results of 16 respondents, it can be seen that most respondents experienced grade 4 *shivering*, totaling 6 people (37.5%).

b. Bivariate Analysis

Bivariate analysis is a data analysis conducted to determine the relationship between the independent variable and the dependent variable in this study, namely the effectiveness between petidine and tramadol 50 mg to overcome shivering in SC patients with spinal anesthesia. In this study, the independent variables were petidine and tramadol and the dependent variable was *shivering*.

Before the data is tested to prove the research hypothesis, it is first tested whether it is normally distributed or not as a prerequisite before using statistical tests. In this study, the *shapiro-wilk* test was used (because the sample size was considered small n = 32). The decision criteria for whether the data is normally distributed or not, can be seen from the empirical chance value or p value which is compared with the significance level α = 0.05. If the odds of the p value in the shapiro-wilk test show a value greater than the significance level α = 0.05, it is concluded that the data is normally distributed. Meanwhile, if the Sig p value in the shapiro-wilk test is less than α = 0.05, it is concluded that the data is not normally distributed. The results of the petidine and ketamine normality test using the *shapiro-wilk test*.

Table 4. 6 Data Normality Test
Normality Test

Shivering Event	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Petidine	.335	16	.000	.784	16	.002
Tramadol	.229	16	.025	.847	16	.012

Source: Primary data 2023

Table 4.6 provides information that from the results of the data normality test using the *Shapiro-Wilk* test, the *p-value* for petidine p-value 0.002 and tramadol 50 mg each p-value 0.012 <0.05, it can be concluded that the data is not normally distributed.

The homogeneity test is used to determine whether the data from the research results in the experimental class and control class have the same variant value or not. It is said to have the same / different variant values (homogeneous) if the significance level is ≥ 0.05 and if the significance level is < 0.05 then the data is concluded not to have the same / different variant values (not homogeneous).

Table 4. Homogeneity Test 7 Homogeneity Test
Data Variance Homogeneity Test

Shivering Event			
Levene Statistic	df1	df2	Sig.
.491	1	30	.489

From the results of the homogeneity test calculation (as in appendix 5) it is known that the significance value is 0.489.

Because the value obtained from the homogeneity test significance level ≥ 0.05 then the data has the same variant value / not different (homogeneous). Furthermore, data analysis will be carried out with the *Mann Whitney U Test*.

The results of the data normality test that has been carried out show that the data is not normally distributed, so to carry out statistical tests, the *Mann Whitney U Test* is carried out.

Table 4. 8 Mann Whitney U Test

No	Variables	N	Mean Rank	Sum of Ranks	p-value
1	Petidine	16	16.66	266.50	0,920
2	Tramadol 50 mg	16	16.34	261.50	
	Total	**32**			

Source: Primary data 2023

Based on the output above, it is known that the mean rank of the petidine group (16.66) is greater than the mean rank of the tramadol 50 mg group (16.34), it can be concluded that the administration of petidine is more effective than the administration of tramadol 50 mg to overcome *shivering* in SC patients with spinal anesthesia.

Discussions

This study was conducted at RSIA Lenggogeni Padang on 32 patients who underwent SC surgery with spinal anesthesia. The purpose of this study was to analyze between petidine and tramadol 50 mg to overcome *shivering* in SC patients with spinal anesthesia at RSIA Lenggogeni Padang. This study uses data obtained directly from patients undergoing spinal anesthesia at RSIA Lenggogeni Padang.

1. Respondent Characteristics

   Based on the results of research from 32 respondents, it can be seen that most of the respondents were between 36-40 years old from both the petidine group and the tramadol 50 mg group as many as 13 people (40.6%), namely the petidine group was mostly between 36-40 years old as many as 7 people (21.8%) while the tramadol 50 mg group was mostly between 36-40 years old as many as 6 people (18.8%).

   The results of this study are in line with research conducted by Millizia *et al.,* (2020) It was mentioned that respondents aged 26-45 15 out of 31 respondents (48.4%) experienced *shivering* events with the results of the bivariate test showing a relationship between age and shivering events, while in research conducted by Syauqi *et al.*, (2019) 12 out of 27 respondents (44.4%) experienced *shivering* with degree 3 of the 12 respondents aged 21-30 years. Based on the description above, it can support the results of research conducted by Susilowati *et al.,* (2017) that late adult respondents are more at risk of *shivering* because they have begun to experience a decrease in metabolism so that the ability to maintain body temperature is reduced. In children, infants, and late adults, the incidence of shivering is influenced by body fat tissue which has one of the functions to maintain body temperature heat, fat tissue is a special tissue that has a lot of influence on parasympathetic and vascularization (Mukarromah and Wulandari, 2019). In late adolescents and adults the incidence of shivering may be influenced by the thyroid gland (Rahmawati, 2020). Based on this, it can be seen that there is a relationship between age and the incidence of shivering.

   Based on the results of 32 respondents, it can be seen that most of the respondents' operation time was 1 hour from both the petidine group and the tramadol 50 mg group as many as 23 people (71.9%), namely the petidine group most of the respondents' operation time was 1 hour as many as 13 people (40.6%) while the tramadol 50 mg group most of the respondents' operation time was 1 hour as many as 10 (31.3%).

   This is in accordance with research conducted by Bhukal et al, the average duration of surgery lasts 50-60 minutes and chills and the frequency of chills

is greater in operations with a duration of more than 30 minutes. The duration of surgery is 60 minutes or more and the type of cesarean section surgery is a high risk of increasing hypothermia in cesarean section patients. This occurs because the long duration of surgery and the type of surgery that performs incisions on the abdominal wall and uterus cause increased heat release from the body to the external environment which increases the risk of hypothermia.

The results of the study of 32 respondents, seen from the BMI that tends towards underweigh from the petidine group with BMI 18.5-20.0 there was shivering degree 3 as many as 3 people and degree 4 as many as 1 person, BMI 20.1-22.5 there was *shivering* degree 3 as many as 1 person and degree 4 as many as 4 people, BMI 22.6-25.0 there was *shivering* degree 0-2 each 1 person and degree 3 as many as 4 people. The tramadol group with BMI 18.5-20.0 occurred shivering of degree 4 of 2 people, BMI 20.1-22.5 occurred shivering of degree 3 of 2 people and degree 4 of 2 people, BMI 22.6-25.0 occurred *shivering* of degree 0-2 of 1 person each, degree 3 of 6 people and degree 4 of 1 person.

Susilowati *et al.,* (2017), in a study entitled "The Correlation Of Body Mass Index With Shivering Of Spinal Anesthesic Patients in PKU Muhammadiyah Yogyakarta Hospital" states that based on the data obtained, respondents who have a low body mass index are more at risk of experiencing a decrease in body temperature during surgery which can trigger shivering. quickly experiencing hypothermia. Research conducted by Muntaha, Sumarni, and Raudotul (2022). The relationship between Body Mass Index and Length of Operation with the Incidence of Hypothermia in Postoperative Patients with Spinal Anesthesia at RSU etro Medical Center Lhokseumawe proves that there is a relationship between BMI (p=0.000) with the incidence of hypothermia in postoperative patients with spinal anesthesia.

The results of this study are in line with research conducted by Susilowati *et al.,* (2017); Hidayah *et al.,* (2021); It was found that there is a relationship between body mass index (BMI) and the incidence of *shivering* in post-spinal anesthesia patients, this was obtained from two comparisons measured according to BMI from the *underweight* group and the obese group and the incidence of shivering occurred most in the *underweight* group this is due to low BMI having thin fat reserves, while fat also has a protective function from loss of body heat so that respondents who have a higher BMI do not easily lose body heat because they have more fat reserves so that they can slow down the occurrence of shivering. However, the occurrence of shivering is influenced by interconnected factors so not only because one factor will cause shivering but many other interconnected factors can affect the occurrence of shivering.

In research Rahmawati (2020) Disebutkan bahwa kejadian menggigil di usia dewasa atau dewasa akhir juga berkaitan erat dengan BMI karena berkaitan dengan jaringan lemak, semakin tipis jaringan lemak, semakin besar risiko menggigil.

Respondents with lean BMI experienced the highest frequency and

percentage of hypothermia after spinal anesthesia compared to patients with normal BMI and obesity. This is because spinal anesthesia affects three elements of thermoregulation, including afferent input elements, signal modulation in the central region, and efferent responses. Spinal anesthesia also negates the adaptation process, interfering with the physiological mechanisms of fat/skin in thermoregulatory function, namely changing the response threshold to the processes of vasoconstriction, tremor, vasodilation and sweating (Tubalawony, 2023). The researcher's assumption is supported by the theory that people with low BMI tend to lose body heat faster and are a risk factor for hypothermia, this is due to the supply of heat-producing energy sources, namely thin fat. Fat stores in the body are very useful as energy reserves. A high BMI has an adequate heat protection system and a source of heat-producing energy such as fat, so the higher the BMI towards obesity the better in maintaining body heat compared to a low BMI because it has more energy reserves.

2. Incidence of *Shivering* in the Petidine Group

Based on the results of the research that has been carried out, it is explained that the administration of petidine to overcome shivering in SC patients with spinal anesthesia obtained the results of 16 respondents, it can be seen that most respondents experienced a degree 3 *shivering* event, totaling 8 people (50.0%).

The results of this study are in accordance with the study conducted by Parsa Tahereh et al, shivering stopped in 18 out of 20 patients who were given intravenous petidine 25 mg. Some literature shows that intravenous petidine 25 mg is considered effective as a treatment for chills.

Petidin is the most effective opioid class in treating shivering due to its anti-shivering effect by activating mu (μ) receptors in the hypothalamus and kappa (κ) receptors in the bone marrow which lowers the shivering threshold. Small doses of Petidine 10-25 mg are often used as post-anesthesia shivering therapy. Intravenous petidine 25 mg is effective and commonly used for post-spinal anesthesia shivering, but petidine injection for shivering has been reported to have specific side effects such as sedation, euphoria, respiratory depression, pruritus, nausea, hypotension, bronchospasm, bradycardia and respiratory depression.

Petidine is also known as Meperidine. Petidine or meperidine belongs to the narcotic class of analgesics. It was first introduced in 1939 by Eisleb and Schauman. The chemical formula of petidine or meperidine is ethyl-1-methyl-4-phenylpiperidine-4-carboxylate (12,15). Because of its atropine-like structure, petidine can cause an increase in heart rate. Petidine is indicated for the usual treatment of high levels of pain. Petidine provides rapid pain relief, which increases patient comfort, reduces anxiety, leads to lower total opioid doses and is not as effective as morphine sulfas. Petidine has 1/800 times lower potency than fentanyl. Petidine causes analgesia, sedation, euphoria, respiratory depression and other central effects (Eman et al., 2022).

3. Incidence of *Shivering* in the Tramadol 50 mg Group

Based on the results of the research that has been carried out, it is explained that the administration of tramadol 50 mg to overcome shivering in SC patients with spinal anesthesia obtained the results of 16 respondents, it can be seen that most respondents experienced grade 4 *shivering* events totaling 6 people (37.5%).

Tramadol is an opioid analgesic synthesis that has a function as a central analgesic and chronic and acute pain reliever, its structure is trans-2 (*dimethylaminomethyl)-1-(m-methoxyphenyl) - cyclohexanol hydrochloride*. This compound is available in the form of white, bitter, and odorless crystals. For solubility, Tramadol is stable in water and ethanol and has a pKa of 9.14. Some of the dimethylaminomethyl groups of tramadol are nitrogen ring code and morphine methylated to bind MOR. Tramadol follows Lipinski's rule of five with molecular weight - 263.19, hydrogen bond donor - 1, hydrogen bond acceptor - 2, molar refractoriness - 1.55 and partition coefficient 2.88 (Subedi et al., 2019).

Tramadol works by inhibiting the reuptake of norepinephrine and 5-hydroxytryptamine, facilitating the release of 5-HT as well as activating μ oioid receptors. Administration of tramadol decreases vasoconstriction and shivering threshold setpoints consistent with its anti-shivering effect.

4. Analyzing Between Petidine and Tramadol 50 mg to manage Shivering in SC patients with Spinal Anesthesia

Based on the output above, it is known that the mean rank of the petidine group (16.66) is greater than the mean rank of the tramadol 50 mg group (16.34), it can be concluded that the administration of petidine is more effective than the administration of tramadol 50 mg to overcome shivering in SC patients with spinal anesthesia.

The p-value in this study was found to be 0.920. This means that the p-value is >0.05. Thus, Ho is accepted so it can be concluded that there is no difference in the incidence of chills between the petidine and tramadol groups. Table 4.8 shows that the incidence of chills and the degree of chills in the tramadol group and the petidine group showed no significant difference (p>0.05). Although there is no difference between petidine and tramadol, both are equally effective in preventing *shivering* because judging from the mean value of petidine which is greater than tramadol, petidine can be concluded to be more effective in preventing s*hivering*.

The results of this study are in accordance with research conducted by (Sasongko, 2015) which stated that the incidence of shivering and the degree of shivering in the tramadol group and the meperidine group showed no significant difference. Of the 24 patients, there were 4 patients (16.6%) from each group who experienced chills after anesthesia. The degree of shivering that occurred was all at degree I, namely intermittent and mild tremors in the jaw and neck muscles. When the tramadol group and the meperidine group were compared with the control group, both showed differences that could

be said to be very significant (p=0.000). Of the 24 patients in the control group, 13 patients (54.16%) experienced post-anesthesia shivering.

The incidence of shivering after administration of petidine after general anesthesia was also more likely to occur in grade 2 shivering, but in all samples there were more incidences of no grade 0 shivering than grade 1 and 2 shivering. This is consistent with the study conducted by Ku et. al. (2012) The highest rate of chills in patients treated with petidine was grade 2 chills (13.6%). Ku et al found that the overall prevalence of shivering in this study was low (15%) compared to the rates reported in 12 other studies aged 40-60 years (Ku et. al., 2012).

Tramadol is a synthetic opioid that acts as a weak agonist against μ, κ, or σ opioid receptors. Tramadol modulates the temperature regulation center in the pre-optic nucleus of the hypothalamus via the raphe nucleus. The raphe nuclues are relay stations of thermal information transmission from the skin to the thalamus and have 5-HT as their neurotransmitter. The action of tramadol on κ opioid receptors reduces the threshold of shivering and vasoconstriction of blood vessels besides that tramadol also works to inhibit the re-uptake of 5-HT in the raphe nucleus so that the mechanism of heat loss and thermogenesis in cold adaptation does not occur and shivering does not occur. In addition, tramadol also works to partially inhibit norepinephrine and at certain concentrations inhibits n-methyl-d-aspartate (NMDA).

The results of this study are not consistent with the meta-analysis of RCTs comparing the effectiveness of tramadol and petidine on post-spinal anesthesia shivering by Wang et al., which found tramadol to be better than petidine. Tramadol had higher efficacy, faster time to control shivering and lower recurrence rate. The incidence of side effects of nausea and vomiting was also lower with tramadol. The effective dose of tramadol to treat chills without significant side effects is 0.5-3 mg/KgBB. This dose is equivalent in effectiveness to administering 0.5 mg/KgBB of petidine.

The study by Nnacheta et al. used tramadol at a dose of 50 mg with an average patient weight in the tramadol group of 78.5 kg. The dose is sufficient but the effectiveness of the drug is reduced because the dose is not based on the patient's weight. Side effects that can be caused by the use of tramadol are nausea, vomiting, dizziness, headache, dry mouth and sedation. Nausea and vomiting were found to be higher in the tramadol group.

Research by Lakhe et al. showed no side effects of nausea and vomiting in the tramadol and ondansetron groups. Nausea and vomiting in tramadol occur due to the inhibitory effect on the 5-HT transporter which plays a role in the reuptake of 5-HT in the presynaptic area of the terminal nerve endings. The 5-HT3 receptor is a subtype of the 5-HT receptor. 5-HT3 receptors are located on the afferents of the vagus nerve and postrema area which play an important role in the modulation of nausea and vomiting. Tramadol causes inhibition of the 5-HT transporter resulting in increased levels of 5-HT. This increase in 5-HT levels is what causes nausea and vomiting. The effective dose of tramadol to treat shivering without significant side effects is 0.5-3

mg/KgBB but nausea and vomiting still occur even at the lowest dose in the study which is 0.5 mg/kgBB. Nausea and vomiting after tramadol administration usually occur after rapid intravenous injection. Slow administration of tramadol (about 1 to 2 minutes) helps prevent the side effects of nausea and vomiting from occurring. However, in the studies of Chowdhury, et al. and Hasanat, et al. this still did not prevent the side effects of nausea and vomiting.

CONCLUSION

Based on the results of 32 respondents, it can be seen that most of the respondents were between 36-40 years old as many as 13 people (40.6%), the length of operation of the respondents was 1 hour as many as 23 people (71.9%) and the BMI of respondents 18.5 - 20.0 occurred shivering grade 3 as many as 3 people and grade 4 as many as 1 person, BMI 20.1 - 22.5 occurred shivering grade 3 as many as 1 person and grade 4 as many as 4 people.

The incidence of shivering in the petidine group to overcome shivering in SC patients with spinal anesthesia, most respondents experienced grade 3 shivering, totaling 8 people (50.0%).

The incidence of shivering in the tramadol 50 mg group to overcome shivering in SC patients with spinal anesthesia, most respondents experienced grade 4 shivering, totaling 6 people (37.5%).

Based on the output results, it is known that the mean rank of the petidine group (16.66) is greater than the mean rank of the tramadol 50 mg group (16.34), it can be concluded that the administration of petidine is more effective than the administration of tramadol 50 mg to overcome shivering in SC patients with spinal anesthesia.

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