

Efficacy of Pethidine in the Treatment of Postoperative Shivering on Elective Caesarean Section Patients at Wad Madani Maternity Teaching Hospital, Gezira State, Sudan

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Abstract: Shivering is one of the most common complications of neuraxial blockade. Some patients find shivering sensation worse than surgical pain post-operatively. Therefore, both prevention and treatment of established shivering should be regarded as clinically relevant interventions during the preoperative period. This prospective experimental study was conducted at Wad Madani Maternity Teaching Hospital and aimed to measure the efficacy of pethidine when used for the treatment of postoperative shivering following spinal anesthesia during the period from November 2018 to February 2019. The sample size included of 40Patients within the American Society of Anesthesia type two physical statuses;25 mg pethidine diluted in 5 ml Normal saline-injected intra veins. All patients were monitored for temperature, heart rate, blood pressure, and oxygen saturation, these parameters were recorded preoperative, and post 10 minutes of operative, then after 10 minutes of pethidine dose administration. Data were analyzed by using a statistical package for social sciences (SPSS). The statistical results showed that there was a significant relationship between hypothermia and the presence of shivering. 90% of cases resolved to shivering, whereas 10% did not resolve, just 2.5% had Nausea and Vomiting and no side effects on the Respiratory and cardiac Systems. Based on those results the study concluded that: a small dose of pethidine 25 mg intra veins is very effective in resolving postoperative shivering with minimum side effects in the gastrointestinal tract and Good Cardiopulmonary stability. The study recommended that: warming tools should be available for patients to prevent heat loss, close monitoring of Patient's temperature intraoperative and in the recovery room, and use of 25mg Pethidine in the Presence of shivering intraoperative or post-spinal anesthesia.

Keywords: Postoperative, Shivering, Caesarean Section, complications, Pethidine.

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INTRODUCTION

Shivering is defined as an involuntary, spontaneous, oscillatory mechanical activity of skeletal muscle associated with increased oxygen consumption, starting from (5 to 30) minutes after the cessation of anesthesia this can be as much as an increase in Metabolic rate by 400% [1]. The various causes of shivering can be divided into thermoregulatory and nonthermoregulatory in nature. Thermoregulatory shivering occurs as a consequence of hypothermia, and to maintain normothermia, vasoconstriction and shivering occur. Nonthermoregulatory shivering is less well understood and may be associated with postop-

pain, the release of endogenous pyrogens, uninhibited spinal reflexes, and adrenal suppression Post anesthesia, apart from patient discomfort also shivering has several deleterious effects including difficulty with monitoring techniques (ECG, BP, SPO2)) [2]. Postoperative shivering is frequently associated with loss of body heat, although hypothermia by itself does not fully explain them. However, they cause discomfort for the patients and sometimes can lead to complications. Along with nausea and vomiting, shivering is one of the most frequent problems during the initial recovery after general anesthesia [3]. Although it is unclear what percentage of the patients experience shivering, its

occurrence has been reported to vary from (5% to 66%) in patients recovering from general anesthesia and 33% during epidural and regional anesthesia [4]. Decreased metabolic rate and shivering are inhibited by anesthetic agents. Pethidine is the most widely used opioid in labor and delivery; It is still commonly used in the United Kingdom and New Zealand, and is the preferred opioid in the United Kingdom for use during labor. Although its mechanism of action is not completely understood, pethidine probably acts directly on the thermoregulatory center or via opioid receptors. It is likely that N-methyl-d-aspartate (NMDA) receptor antagonists also modulate thermoregulation at numerous levels. Like morphine, pethidine exerts its analgesic consequences by working as an agonist at the μ -opioid receptor. It also has an agonistic κ -opioid receptor action, which may be involved in the anti-shivering effects it elicits so a good choice to treat shivering [5].

MATERIALS AND METHODS

Study design

Prospective, experimental study

Study setting

The study was conducted at Wad Medani maternity Teaching Hospital in Wad Medani City, **Gezira State, Sudan**

Study period

From November 2018 to February 2019

Study population

The population targeted was elective cesarean section patients.

Sample size

Among 174 elective cesarean section patients with ASA II, there were 40 cases had shivered and were included in this study.

Ethical considerations

All participants were informed about the objective and need of this study and verbal consent was obtained from them, all personal information concerning their health status was kept confidential.

DATA COLLECTION

Data were collected using a structured questionnaire which was designed for the purposes of the study. All patients were monitored for the changes in temperature, heart rate, blood pressure, oxygen saturation, and GIT & Respiratory system side effects.

Data collection techniques

This prospective experimental study was conducted at the anesthesiology department in Wad Madani maternity Hospital. I included 40 female patients, 18–42 years of age scheduled to undergo elective cesarean section surgery using spinal

anesthesia. For patients with ASA physical status II, The study drugs were administered as follows (25 mg) pethidine IV dilution in (5 ml) Normal saline and injection slowly. Spinal anesthesia was performed at either (L3/4) or (L4/5) interspaces. Hyperbaric bupivacaine, (10 - 12.5 mg) was injected using a (24 gauge) spinal needle with the patients in the sitting position. Intraoperatively, all patients were monitored T, HR, MAP, SpO₂, respiratory rate (cycle/min), These parameters were recorded preoperative, and post (10 min) of operative, then after (10 min) of pethidine dose administration. Skin temperature forehead was measured by an electronic infrared thermometer. Side effects like hypotension, nausea, and vomiting, and respiratory depression were recorded. Hypotension was treated by crystalloid infusion and if necessary IV ephedrine (5 mg).

DATA ANALYSIS

Data were entered, checked, and analyzed using Microsoft Excel 2007 and SPSS (Statistical Package for the Social Science), version 11.5. Proportional data were presented as descriptive frequencies and percentages.

RESULT

Presents the Descriptive Statistics and meaning of the age Weight and Vital signs measured (Table 1). Distribution of the study population according to the efficacy of pethidine on Resolve of Shivering the Figure shows the effect percentage of management by using (25 mg) pethidine IV, where is (90%) of cases resolving shivering means the smaller dose of pethidine drug is very effective (Figure 1). Distribution of the study population according to the side effects of pethidine on the Respiratory system. The Figure shows (0%) which means there is no adverse effect of the use of a small dose of pethidine on the respiratory system (Figure 2). Distribution of the study population according to a side effect of pethidine on GIT. The Figure shows an adverse effect of a smaller dose of pethidine on GIT was (2.5%) whereas (97.5%) were not affected which means most of the cases do not have an adverse effect (Figure 3). The correlation of the reading pre-operative and post 10 min of operative Temperature (0.001), Systole blood pressure (0.00), HR(0.043) less than 0.05 that Mean *P.value* is significant and Spo₂(0.146) more than 0.05 that mean *P.value* is insignificant (Table 2). The correlation of the reading before and after pethidine dose Temperature(0.000), Sys blood pressure(0.000), HR(0.000) less than 0.05 that Mean *P.value* is significant and Spo₂(0.063) more than 0.05 that mean *P.value* is insignificant (Table 3). The correlation of the reading before and after 10 min of Operative Sys blood pressure(0.000), Dia blood pressure (0.014), Temperature (0.001), HR(0.043) less than 0.05 that Mean *P.value* is significant and Spo₂(0.146) more than 0.05 that mean *P.value* is insignificant (Table 4). The correlation of the reading pre and post pethidine dose Sys blood pressure(0.000), Temperature (0.000), HR (0.000) less than 0.05 that Mean *P.value* is significant and Dia bl

ood pressure (0.095), Sp_o₂(0.063) more than 0.05 that mean *P.value* is insignificant(Table 4).

Table-1: Shows Descriptive Statistics

	N	Smaller	Maximum			Std. Deviation
				Mean	Std. Error	
Age/year	40	19.00	42.00	28.6250	.87975	5.56402
Weight/kg	40	50.00	88.00	68.7000	1.66726	10.54465
Duration of operation/min	40	45.00	80.00	57.1250	1.62006	10.24617
Pre-Operative Temperature C°	40	34.50	37.00	35.9750	.08914	.56376
Post-10 min Temperature C°	40	34.40	37.00	35.7725	.11134	.70420
After-pethidine Temperature C°	40	34.40	37.00	35.9125	.09768	.61777
Pre-Operative SBP mmHg	40	100.00	160.00	128.7500	2.17408	13.75006
Pre-Operative DBP mmHg	40	60.00	113.00	78.7250	1.60248	10.13495
Post-10 min SBP mmHg	40	94.00	183.00	123.9500	2.81433	17.79938
Post-10 min DBP mmHg	40	53.00	95.00	73.9750	1.65927	10.49417
After-pethidine SBP mmHg	40	100.00	181.00	129.1750	2.95932	18.71635
After-pethidine DBP mmHg	40	53.00	112.00	77.2500	1.94203	12.28247
Pre-operative HR b/min	40	57.00	140.00	93.5250	2.81411	17.79799
Post-10 min HR b/min	40	63.00	130.00	92.1250	2.54352	16.08660
After-pethidine HR b/min	40	56.00	132.00	85.4250	2.68373	16.97341
Pre-Operative Spo ₂ %	40	95.00	100.00	99.1250	.16088	1.01748
Post-10 min Spo ₂ %	40	91.00	100.00	98.1750	.27477	1.73778
After-pethidine Spo ₂ %	40	96.00	100.00	98.7750	.15395	.97369
Valid N (listwie)	40					

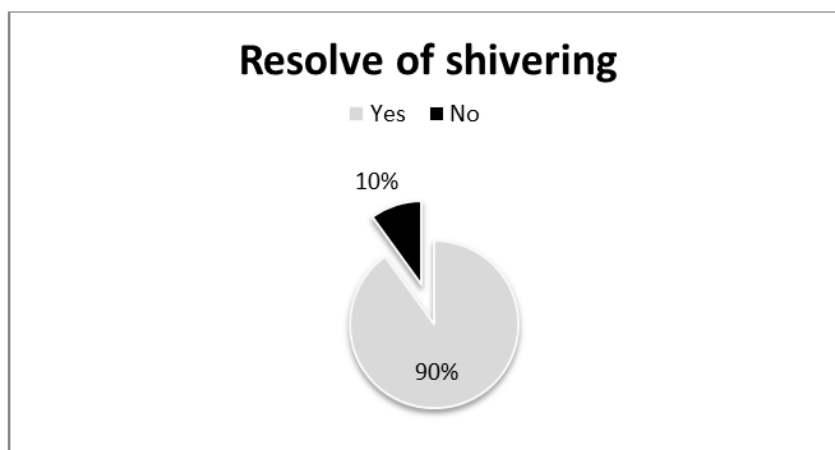


Fig-1: Show the Distribution of the study population according to the efficacy of pethidine on Resolving Shivering.

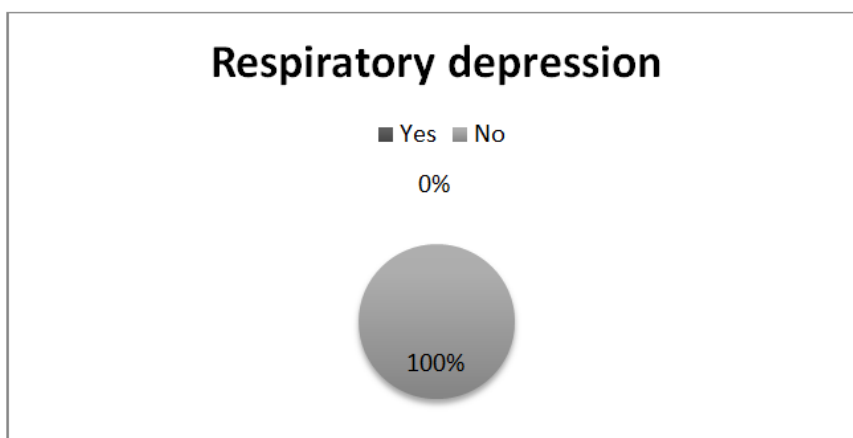


Fig-2: Shows the Distribution of the study population according to the side effects of pethidine on the Respiratory system.

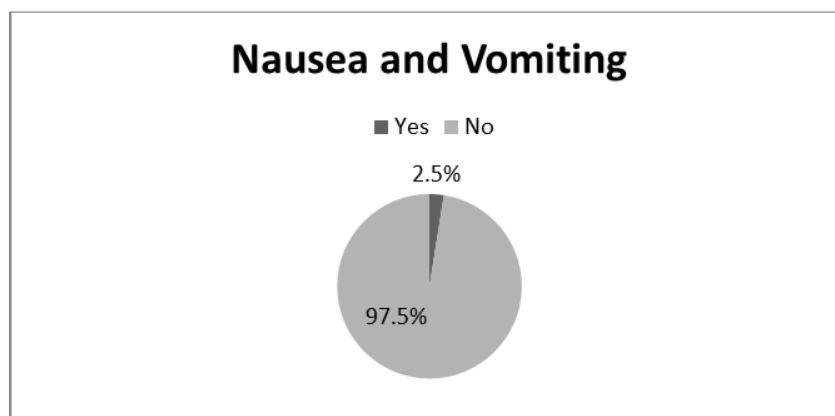


Fig-3: Shows the distribution of the study population according to a side effect of pethidine on GIT.

Table-2: Shows the correlation of the reading pre-operative and post 10 min of operative Temperature.

		N	Correlation	P.value
Pair 1	Pre-Operative Temperature& Post-10 min Temperature	40	.497	.001
Pair 2	Pre-Operative SBP& Post-10 min SBP	40	.606	.000
Pair 3	Pre-Operative HR & Post-10 min HR	40	.322	.043
Pair 4	Pre-Operative SpO ₂ & Post-10 min SpO ₂	40	.234	.146

Table-3: Shows the correlation of the reading before and after pethidine dose Temperature

		N	Correlation	p.value
Pair 1	before-pethidine T ^o & After-pethidine T ^o	40	.749	.000
Pair 2	before-pethidine SBP& After-pethidine SBP	40	.579	.000
Pair 3	before-pethidine HR & After-pethidineHR	40	.779	.000
Pair 4	before-pethidine SpO ₂ & After-pethidine SpO ₂	40	.297	.063

Table-4: Shows the correlation of the reading before and after 10 min of Operative Sys blood pressure.

Parameter	Pre-Operative Mean ± SD	Post-10 min Mean ± SD	P .value
Systolic blood pressure, mmHg	128.75 ± 13.75	123.95 ± 17.80	0.000
Diastolic blood pressure, mmHg	78.73 ± 10.13	73.98 ± 10.49	0.014
Body temperature, ° C	35.96 ± 0.56	35.77 ± 0.70	0.001
Heart rate, b/ min	93.52 ± 17.78	92.13 ± 16.09	0.043
Oxygen saturation %	99.13 ± 1.08	98.18 ± 1.74	0.146

Table-5: Shows the correlation of the reading pre and post pethidine dose Sys blood pressure (0.000), Temperature.

Parameter	Before Pethidine Mean ± SD	After Pethidine Mean ± SD	P. value
Systolic blood pressure, mmHg	123.95 ± 17.78	129.18 ± 18.72	0.000
Diastolic blood pressure, mmHg	73.98 ± 10.49	77.25 ± 12.28	0.095
Body temperature, ° C	35.77 ± 0.70	35.91 ± 0.62	0.000
Heart rate, b/min	92.13 ± 16.9	85.43 ± 16.97	0.000
Oxygen saturation %	98.18 ± 1.74	98.78 ± 0.15	0.063

DISCUSSION

The descriptive results of 40 case study populations show that: their age ranged from 19 to 42 years, their weight ranged between 50 to 88 kg, and the time of operation was as ranged between 45 to 80mints. The study found that (36) patients shivering were relieved after they where had 25 mg iv pethidine which means the efficacy of pethidine was (90%) whereas (10%) of patients were not responded. This result was neared to a study done by Koay. How stated that pethidine relieved shivering in (95%) of patients [6]. The difference is perhaps due to using a repeated dose

of misoprostol in some cases. Administration of misoprostol increases the incidence of shivering by lowering the threshold for physiological shivering, and a prostaglandin E1 effect on central thermoregulatory mechanisms” [7]. The study found that; there was a statistical correlation between the incidence of shivering and changes in physical status reading before and after 10 min of Operative, Sys blood pressure (0.000), Dia blood pressure (0.014), Temperature (0.001), HR (0.043) less than 0.05 that Mean P.value is significant. This finding was agreed with a study done by Lopez [8]. They stated that effective prevention and treatment

of shivering have become an essential step in increasing postoperative comfort and reducing shivering-related complications [8]. Finally, this study showed that: (25 mg) pethidine has no effect on respiratory depression and had minor side effects on GIT (2.5%) as nausea, and vomiting. This finding was agreed with a study done by Mohat [9]. They stated that pethidine 25 mg was most often tested and performed consistently best at 1, 5, 10, and 15 min. Hence, it was decided to use this dose of pethidine for the treatment of shivering [9].

CONCLUSION

Based on the result of this study; the study concluded that: there was a significant relationship between hypothermia and the presence of shivering, 25 mg pethidine IV was very effective in resolving postoperative shivering with minimum side effects on Gastrointestinal Tract and Good Cardiopulmonary stability.

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