Original Research

A comparison of the effect of dexamethasone and pethidine for prevention of shivering after spinal anesthesia in caesarean section: randomization clinical trial

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ABSTRACT

Background: Postanesthetic shivering is one of the most common complications and problems after operations. Medications and drugs can be used to prevent postanesthetic shivering. The aim of this study is to compare the effects of Dexamethasone and Pethidine in preventing postanesthetic shivering after spinal anesthesia in Iranian women undergoing caesarean section. **Method:** This double-blind randomized clinical trial was performed in 66 pregnant women who were referred to Ayatollah Moosavi Hospital in Zanjan, Iran for elective cesarean section, from December 2011 to November 2012. All participants who have ASA I-II were randomly classified into three groups: Dexamethasone receivers (Group A), Pethidine receivers (Group B), and Normal Saline receivers (Group C). Data were collected and analyzed using $SPSS_{16}$ software. IRCT registration number of this study is IRCT201112198469N1. **Conclusion**: Although statistically there was no significant difference between the three groups of Dexamethasone, Pethidine and Normal Saline receivers regarding shivering reduction; clinical complication rate in Dexamethasone group was lower comparedto Pethidine and Normal Saline groups. **Results:** There was no significant difference between three groups regarding shivering reduction. There were 11 (72.5%) trembling cases in Normal Saline group, 6 cases (27.3%) in Dexamethasone group, and 12 cases (54.5%) in Pethidine group.

Key words: Dexamethasone, Pethidine, Postanaesth, Randomization Clinical Trial, Shivering, Spinal anesthesia

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INTRODUCTION

Postanesthetic shivering is an unpleasant problem and one of the most common complications after operations, that occurs in 6.3 to 65 percent of patients in the recovery phase after surgeries[1–3] and about 30% was epidural and spinal anesthesia[4]. Generally, all anesthesia dysregulate body temperature control[4–6]. The incidence show to less patients are normal temperature[6]. Shivering is considered to be one of six important complications after general anesthesia[2]. Many problems and side effects such as increasing postoperative pain, elevating tissue oxygen consumption, hypertension, tachycardia, increasing intracranial pressure (ICP), and other physiological changes[2,4–9]. Postanesthetic shivering is very unpleasant and complicated especially in patients with poor cardiac reserve[10–12]. Therefore, reducing postanesthetic shivering is very serious and important[11]. There are many pharmacological medications have been studied[13]. Medical methods and drugs can be used to prevent and reduce the postoperative shivering temperature threshold and the core and skin temperature gradient[13]. Opioids were mostly used and with more doses than in the past. Dexamethasone and Pethidine were two drugs that were used to reduce postoperative shivering and known to be effective[12]. Between the two, Pethidine have been widely prescribed and is the first line in anesthesia[14].

The aim of this study is to compare the effects of Dexamethasone and Pethidine in preventing shivering after spinal anesthesia in Iranian women undergoing caesarean section.

METHODS

Ethical approval

This study was approved by the Local Ethics Committee of Zanjan University of medical science, Zanjan, Iran and registered in the Iranian Registry of Clinical Trials (IRCT.ir); ID number: IRCT201112198469N1. In this study, informed consents were received from all individuals that participated in this study and their partners.

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Experimental design

This single blind randomized clinical trial study was performed in 66 pregnant women who experienced shivering following spinal anesthesia for elective cesarean section and were referred to obstetrics and gynecology department of Ayatollah Mousavi Hospital in Zanjan city affiliated Zanjan University of medical science, from December 2011 to November 2012. All participants who have ASA physical status (ASA-PS) scale I-II and do not have any disorder or disease were enrolled in this study and randomly divided into three groups (n=22) (**Figure 1**). The drugs were intravenously injected to the patients. We randomly allocated our cases by Excel software using Rand between order. Allocation into each group was based on opening sealed and opaque envelopes indicating the drug name. Clinicians were not blinded to the treatment allocation.

Group 1: Dexamethasone, 0.6 mg/kg (10 mL)
Group 2: Pethidine, 0.5 mg/kg (10 mL)
Group 3: Normal Saline (10 mL)

Outcomes evaluation

The temperature was measured and recorded for all patients at the entrance to the operating room. Prescription serum temperature was about 30 to 35 °C and the operation temperature was about 23 to 25 °C. The outcome variables are core temperature, nausea, headache, and shivering that were recorded before, and after surgery in the recovery room. Core temperature was measured by mercury thermometer. The frequency of nausea, headache, and shivering was measured through visual signs by physicians.

Statistical analysis

In this study, data were analyzed using SPSS software version 16. Descriptive analyses were performed including means and standard deviations (SD). Also, in this study, independent T test and One Way ANOVA were used to statistically test mean differences between groups and variables. Logistic Regression model was used to predict the adjusted odds ratio (OR). The level of significance was set at $p < 0.05$ for all analyses.

RESULTS

The results showed, mean and SD of age, BMI, body temperature, heart rate, systolic and diastolic blood pressure, and bleeding in all patients (n=66) were 28.80 ± 5.82, 31.90 ± 2.09, 36.83 ± 0.56, 80.88 ± 6.80, 10.87 ± 1.55, 7.07 ± 0.72, and 930.76 ± 111.385 respectively (**Table 1**). At the same time, in **Table 1**, the mean and SD of age, BMI, and bleeding in groups treated with Dexamethasone, Pethidine, and normal saline were 28 ± 6.27, 31.70 ± 1.90, and 772.73 ± 132.49, 29.36 ± 5.05, 31.79 ± 2.04, and 740.00 ± 117.14, 29.41 ± 6.24, 32.22 ± 2.37, and 1279.55 ± 1955.37, respectively. Those are not statistically different.

Table 2 introduced frequency of shivering, nausea and headache in the three groups. 16 (72.7%) patients in the Dexamethasone group, 10 (45.5%) patients in the Pethidine group, and 11 (50%) patients in the Normal saline group had to shivering (P = 0.149). Also, 45.5% patients in the Dexamethasone group, 40.9% patients in the Pethidine group, and 50% patients in the Normal saline group experienced nausea, which is not statistically different (P = 0.832) (**Figure 2**).

DISCUSSION

Previous studies showed some drugs can reduce the body core and skin temperature gradient and decrease the skin temperature[3]. On the other hand, Dexamethasone is effective in reducing shivering in patients by regulating immune responses[12]. Most studies showed that Dexamethasone is effective in preventing postoperative shivering with spinal anesthesia[15,16]. The mechanism of post-anesthetic shivering can be established as a thermo-regulatory reaction to low body temperature that occurs during surgeries, which leads to clonic and tonic patterns[3,4,16].

Our results showed that there was no significant difference between the three groups receiving Pethidine, Dexamethasone, and normal saline in headache complication. However, Dexamethasone prophylaxis was reported to have positive effects on headache after spinal anesthesia for cesarean section[17]. In this study, we showed that there was no significant difference between the three groups in nausea complication. Pethidine was shown to be more effective in reducing postoperative shivering after the cesarean section[18]. In some of the studies showed the efficacy of Pethidine in reduce and prevention of shivering after surgeries[10,17]. In the some studies, Dexamethasone and Pethidine were also reported to be equally effective in reducing and preventing postoperative shivering after surgeries[17].

In our study, no significant differences between the three groups were observed in vital signs. However, diastolic pressure was slightly lower in patients receiving Pethidine. The anti-shivering action of pethidine was inhibited by high dose of naloxone, which blocks both μ and k receptors, but not by low dose of naloxone which block only μ receptors[19]. A disadvantage of Pethidine is that it can cause respiratory depression

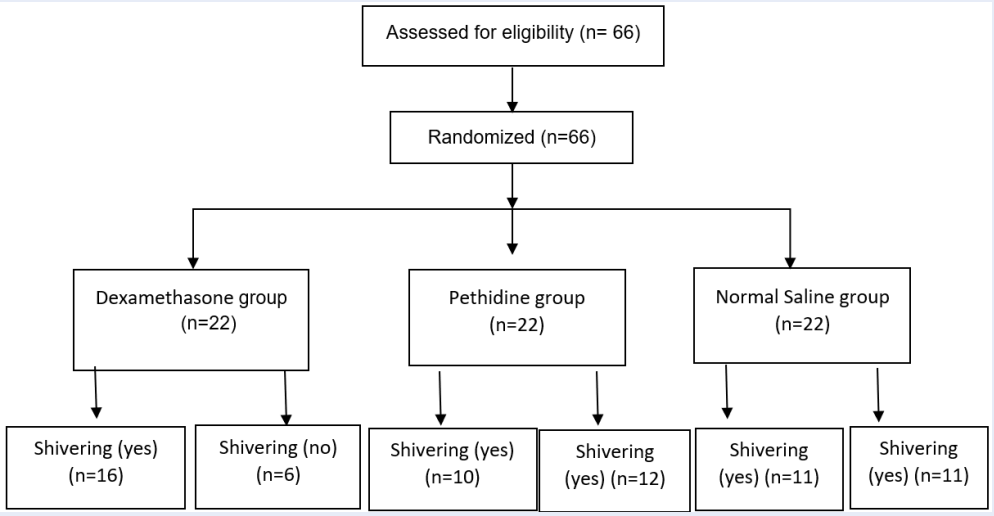

Figure 1: **Consort diagram of the trial.**

Table 1: **Comparison of the mean and SD variables in three groups**

Variable	Total (n=66)	Dexamethasone (n=22)	Pethidine (n=22)	Normal Saline (n=22)	P- value
Age (year)	28.80 ± 5.82	28 ± 6.27	29.36 ± 5.05	29.41 ± 6.24	0.125
BMI (kg/m2)	31.90 ± 2.09	31.70 ± 1.90	31.79 ± 2.04	32.22 ± 2.37	0.683
Body temperature (^{0}C)	36.83 ± 0.56	36.88 ± 0.59	36.83 ± 0.55	36.78 ± 0.56	0.374
Heart rate (n/min)	80.88 ± 6.80	78.50 ± 5.50	81.45 ± 8.39	82.68 ± 5.74	0.211
Systolic Blood pressure (mmHg)	10.87 ± 1.55	10.72 ± 2.20	10.93 ± 1.17	10.97 ± 1.09	0.855
Diastolic Blood pressure (mmHg)	7.07 ± 0.72	7.20 ± 0.72	6.78 ± 0.835	7.25 ± 0.49	0.068
Bleeding	930.76 ± 111.385	772.73 ± 132.49	740.00 ± 117.14	1279.55 ± 1955.37	0.217

in the presence of previously administered opioids or anesthetics. Moreover, nausea and vomiting are also important side effects of Pethidine[20].

The limitation of this study is small sample size. Hence, further studies with a larger sample size is recommended.

CONCLUSION

Although statistically there was no significant difference between the three groups of Dexamethasone, Pethidine and Normal Saline receivers regarding the reduction of shivering[13–16]; because Pethidine is an opioid analgesic, it may interact with another drugs and lead to respiratory depression[16], and clinical complication rate in Dexamethasone group was lower comparing to Pethidine and Normal Saline groups. Hence, Dexamethasone prophylaxis is recommended.

COMPETING INTERESTS

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

All authors contributed to the design of the research. HGH, YM, and ST collected the data. ZKH, YM con-

Table 2: Comparison of the frequency outcomes in three groups

Variable	Total (n=66)	Dexamethasone (n=22)	Pethidine (n=22)	Normal saline (n=22)	P -value
Shivering					
Yes	37 (56.1%)	16 (72.7%)	10 (45.5%)	11 (50%)	0.149
No	29 (43.9%)	6 (27.3%)	12 (54.5%)	11 (50%)	
Nausea					
Yes	30 (45.5%)	10 (45.5%)	9 (40.9%)	11 (50%)	0.832
No	36 (54.5%)	12 (54.5%)	13 (59.1%)	11 (50%)	
Headache					
Yes	20 (30.3%)	6 (27.3%)	5 (22.7%)	9 (40.9%)	0.394
No	46 (69.7%)	16 (72.7%)	17 (77.3%)	19 (59.1%)	

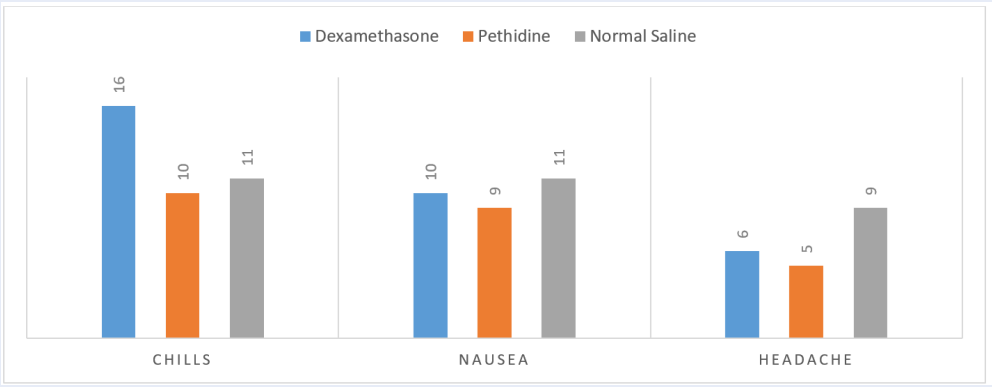

Figure 2: Comparison of the frequency the incidence of outcomes in three groups.

ducted analysis and interpretation of data. All authors drafted the first version. HGH, ZKH, YM, and ST edited the first draft. All authors reviewed, commented and approved the final draft.

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Zanjan University of medical science, Zanjan, Iran.

ABBREVIATIONS

RCT: Randomized, Controlled Trial

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