DOI: https://doi.org/10.53350/pjmhs22169451

ORIGINAL ARTICLE

Comparison of Low Dose Ketamine Versus Normal Saline in Prevention of Postoperative Shivering

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ABSTRACT
Background: Shaking is a frequent adverse effect of anesthesia, which may potentially exacerbate the discomfort. It is characterized by involuntary muscular contractions that can affect many muscle groups. It is extremely unpleasant and physically demanding.
Objective: The purpose of this study is to examine the efficacy of Low Dose Ketamine against normal saline in preventing postoperative trembling.
Study Design: Randomized Controlled Trial.
Setting: Department of Anesthesiology, Khyber Teaching Hospital, Peshawar.
Duration of Study: This study was conducted from 1st July 2020 to 31st December 2020.
Subjects and Methods: Sixty male and female patients who volunteered for lower abdominal surgery were studied. Each block of six was shuffled before the randomization procedure began. Thirty people made up the Low Dose Ketamine group (A), and the Normal Saline group (B) (B). After 30 minutes, the Crossley and Mahajan scale was used to measure the degree to which both groups were shivering after the surgical incisions had healed. This was done so that we could gauge the accuracy of the measuring device.
Results: Age range in this study was from 20 to 60 years. Efficacy was observed in 28 (93.3%) patients in group A as compare to 16 (53.3%) patients in group B (P= 0.000).
Conclusion: As a consequence of this research, it appears that 0.25 mg/kg of ketamine is an effective dose for minimizing postoperative shivering after elective surgery.
Keywords: Postoperative shivering, Low dose ketamine, Efficacy

INTRODUCTION
Anesthesia frequently causes a side effect known as shaking, which can exacerbate any underlying discomfort. It's characterized by jerky, uncontrollable movements that might affect multiple muscles at once. It's quite demanding on the body and generates a great deal of pain and distress. If the patient is shaky after getting anesthesia, it may be difficult to obtain an accurate heart rate (ECG) and blood oxygen saturation reading (SpO2). The most notable effect it may have is to enhance oxygen use, minute ventilation, and carbon dioxide production. Patients who are elderly or who have preexisting heart conditions may be at a higher risk of death if they experience shaking after anesthesia[1].

The causes of human shaking are not completely understood. Non-thermoregulatory and thermoregulatory variables, such as exposure to cold weather, insufficient pain treatment, or opiate withdrawal, can all contribute to postoperative shivering. Second, the best way to treat and prevent a disease has not been established as the gold standard. [2]Numerous drugs and methods have been explored and studied with the goal of decreasing postoperative trembling, including meperidine, alfentanil, tramadol, magnesium sulfate, ondansetron, dolasetron, and dexmedetomidine.[3]

In certain situations, ketamine has been used to treat those who shake others. Noncompetitive antagonist for the N-methyl-D-aspartate (NMDA) receptor. It may be feasible to eliminate post-anesthetic shivering by modifying the path that heat takes from the center of the body to the skin. Petskul S and coworkers found that a small amount of ketamine was more effective than ordinary saline at decreasing postoperative trembling. According to research by Shakya S. and colleagues, low-dose ketamine was 97.5 percent effective compared to normal saline's 57.5 percent.[4-5]

Though a lot of research has been done on the topic of ketamine's effectiveness in preventing post-anesthesia shivering, there is still no agreement on how to best use this medication. Consequently, if we had accurate data on the benefits and drawbacks of ketamine use, we could identify the most efficient way to implement it.[6]

While some research has found no change in the frequency with which people shake after surgery, other studies have found significant differences in the extent to which they are able to do daily tasks. [7,8] Because of this, I plan to look into how effective low-dose ketamine is compared to ordinary saline in ending postoperative trembling.

MATERIAL AND METHODS
A randomized controlled trial was performed in the field of anesthesiology at the Khyber Teaching Hospital in Peshawar. The time frame for this study is 1 July 2020 to 31 December 2020. Selected were sixty people (30 in each group) Sample size was calculated with the following characteristics in mind: 95% confidence level, 5% alpha, 80% power, and an expected proportion of (efficacy) of 97.5 percent in population 1 and 57.5 percent in population 2. A technique known as non-probability sequential sampling was used to collect the samples.

Data Collection Procedure: The study was approved by the hospital's ethics committee and the CPSP's research department, and 60 anesthesiology residents and fellows consented to take part in it. Those people met the criteria for inclusion. Each patient's name, age, gender, weight, height, and body mass index (BMI), which can be calculated as follows, were recorded after each procedure. Kg/m2 is the same as kg/m2, which is the square of a person's height in meters. Kg is the standard unit of measurement for mass. Study participants signed a paper indicating that they understood the risks associated with participating in the study but still wanted to take part in it nevertheless.

By splicing together various 6-block designs, a chaotic pattern was created. Thirty people participated in the study; 10 each in the Low Dose Ketamine group (A) and the Normal Saline group (B) (B). Group A patients were given ketamine at a dose of 0.25 mg/kg diluted to a volume of 2 ml by an anesthesiologist who was not in charge of the patients. Two milliliters was the amount of liquid used. Each person in Group B was injected with 2 mL of physiological saline.

During the experiment's premedication phase, only some of the patients were given diazepam. Prior to induction, noninvasive measurements were taken of blood pressure, oxygen saturation, electrocardiogram (ECG), and core body temperature (TC).One to two milligrams per kilogram of the analgesic and muscle relaxant propofol were administered to initiate the induction procedure after a period of preoxygenation and preloading with a warm isotonic solution.

The GeniusTM 2 Tympanic thermometer was used to record the core temperature 30 minutes after induction. The patient remained under anesthesia thanks to the combination of oxygen, air, and sevoflurane. Each patient was given an air force warmer to keep them comfortable during the treatment, and the amount of warming was calculated based on their body surface area. Within thirty minutes of the surgical incisions being closed, the Crossley and Mahajan scale was used to assess the degree of shivering in both groups, and the form was used to record the results.

Data Analysis: IBM-SPSS 22, a program for statistical analysis, was used to look at the data. Age, procedure length, weight, height, and body mass index (BMI) were just few of the variables for which the mean and standard deviation (SD) were reported. Quantitative criteria such as ASA rating, operation type, and level of success were factored into the calculations.

The effectiveness of the two groups was compared using the Chi-square test, and a p value of 0.05 was considered to be statistically significant. We divided our sample into groups based on age, gender, length of procedure, ASA score, and kind of surgery to see how these factors affected our results. The chi-square test was performed on both groups of people after the data were stratified. To be considered significant, the p-value must be less than 0.05.

RESULTS

Participants' ages ranged from 20 to 60 years old in this study, with Group A having an average age of 38.3007.33 years and Group B's average age of 41.1339.09 years. On average, the procedure was predicted to take 66.53314.39 minutes in Group A, but 69.36613.21 minutes in Group B. Group A had an average weight of 78.1667.41 kg, while group B had an average weight of 80.3005.19 kg. In general, people were 1.63 meters tall.

Table 1: Mean±SD of patients according to age, duration of procedure, weight, height and BMI

Demographics	Group A n=30 Mean±SD	Group B n=30 Mean±SD
Age (years)	38.300±7.33	41.133±9.09
Duration of procedure (min)	66.533±14.39	69.366±13.21
Weight (Kg)	78.166±7.41	80.300±5.19
Height (m)	1.636±0.04	1.636±0.04
BMI (Kg/m2)	29.252±3.25	30.032±2.37

Table 2: Frequency and percentage of ASA grade in both groups

ASA grade	Group A, N=30	Group B, N=30
I	23 (76.7%)	21 (70%)
II	7 (23.3%)	9 (30%)
Total	30 (100%)	30 (100%)
Frequency and percentage of type of surgery in both groups		
Type of surgery	Group A, N=30	Group B, N=30
General	17 (56.7%)	20 (66.7%)
Gynaecological	13 (43.3%)	10 (33.3%)
Total	30 (100%)	30 (100%)

Table 3: Comparison of efficacy in both groups

Efficacy	Group A (n=30)	Group B (n=30)	P value
Yes	28 (93.3%)	16 (53.3%)	0.000
No	28 (93.3%)	14 (46.7%)	
Total	30 (100%)	30 (100%)	

Table-II shows that the vast majority of people in both groups scored in the first ASA category. Table-III provides a breakdown of the surgical outcomes for both groups based on the frequency and total number of surgeries. As can be shown in Table IV, the treatment was effective for 28 (93.3%) of Group A patients but only for 16 (53.3%) of Group B patients (P = 0.000). Tables V, VI, VII, and IX detail the varying levels of effectiveness between the two groups based on age, gender, duration of treatment, ASA score, and kind of surgery.

Table 4: Stratification of efficacy with respect to age in both groups

Group	Efficacy (For Age 20-40 years)		P value
	Yes	no	0.029
A	17(100%)	0(0%)	
B	9(75%)	3(25%)	
Group	Efficacy (For Age 41-60 years)		P value
	yes	No	0.010
A	11(84.6%)	2(15.4%)	
B	7(38.9%)	11(61.1%)	
Stratification of efficacy with respect to gender in both groups			
Group	Efficacy (For Male gender)		P value
	Yes	no	0.000
A	15(88.2%)	2(11.8%)	
B	6(30%)	14(17%)	
Group	Efficacy (For Female gender)		P value
	Yes	no	1.000
A	13(100%)	0(0%)	
B	10(100%)	0(0%)	
Stratification of efficacy with respect to duration of procedure in both groups			
Group	For duration ≤ 60 mins		P value
	Yes	no	1.000
A	14(100%)	0(0%)	
B	10(100%)	0(0%)	
Group	For duration > 60 mins		P value
	Yes	no	0.000
A	14(87.5%)	2(12.5%)	
B	6(30%)	14(70%)	
Stratification of efficacy with respect to ASA grade in both groups			
Group	For ASA I		P value
	Yes	no	0.012
A	23(100%)	0(0%)	
B	16(76.2%)	5(23.8%)	
Group	For ASA II		P value
	Yes	no	0.002
A	5(71.4%)	2(28.6%)	
B	0(0%)	9(100%)	
Stratification of efficacy with respect to type of surgery in both groups			
Group	For General surgery		P value
	Yes	no	0.000
A	15(88.2%)	2(11.8%)	
B	6(30%)	14(70%)	
Group	For Gynaecological surgery		P value
	Yes	no	1.000
A	13(100%)	0(0%)	
B	10(100%)	0(0%)	

DISCUSSION

From 5–65% of surgical patients experience postoperative tremors related to the anesthetic. When administered, the majority of general anesthetics cause a patient's core temperature to drop, which disrupts the body's natural temperature regulation.[9] Ketamine achieves this effect by increasing norepinephrine concentrations in the blood while simultaneously narrowing blood vessels in the body's periphery.[10] The elevated tympanic membrane temperatures allowed us to identify ketamine users. This study suggests that ketamine can lessen patients' risk of experiencing post-operative shaking.

It was found in a study by Petskul S, et al. that a low dose of ketamine was more effective than a standard dose of saline at preventing post-operative shivering. Results from the study by Shakya S. and colleagues showed that low-dose ketamine was successful 97.5% of the time, while normal saline was only successful 57.5% of the time. [11]

The research demonstrated a link between a low ketamine dose (0.25 mg/kg) and less side effects like hallucinations and exhaustion. Shaking was reported in 5.1% of ketamine-treated patients, 17.9% of ondansetron-treated patients, and 71.8% of saline-treated patients after surgery, according to research by Mohtadi and colleagues (out of a total of 339).[12] The usefulness of 0.25 and 0.5 mg/kg ketamine in reducing patient tremors during cesarean sections was studied by Kose et al. The drug's safety was also looked into.

As was shown in all of the aforementioned trials, ketamine was much more effective than a placebo in reducing postoperative trembling, leading the researchers of this study to draw the same conclusion. Patients who had spinal fusion surgery were studied by Gupta et al. to determine the effects of ketamine alone and in combination with midazolam on postoperative chills.[13] The study found that compared to a placebo, ketamine significantly decreased postoperative trembling. Koase and his coworkers looked at the correlation between ketamine and postoperative tremors. It was shown that people felt sleepier after taking a larger dose of ketamine. [12]

Zhou et al study results didn't quite square with ours, unfortunately. Researchers found that ketamine users had the same rates of dizziness, nausea, and vomiting as those who took a placebo. [13]It contradicts all we have found. Previous research[14] looked at ketamine's ability to prevent postoperative trembling in patients and found it to be equivalent to the findings of that study.

Since the sort of operation and its duration are both factors in post-operative chills, the studies don't always agree with each other. [15]The duration and type of operation both play a role in the likelihood of experiencing postoperative chills. To account for the differences, tests needed to be conducted on somewhat larger samples. It is also suggested that this be carried out in multiple sites.[16]

CONCLUSION

Based on the results of this study, administering a dose of ketamine equivalent to 0.25 milligrams per kilogram of body weight is an efficient strategy to reduce postoperative tremor in patients undergoing elective surgery. The lower dose of ketamine used in elective surgery is recommended because it generates less side effects, such as hallucinations and sedation scores.

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