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ORIGINAL ARTICLE

The Effect of Single Dose Dexamethasone on Postoperative Pain and Post Operative Nausea Vomiting in Patients Undergoing Breast Surgery Under General Anaesthesia

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ABSTRACT

Objective: The primary purpose of this study is to assess the efficacy of intravenous dexamethasone in preventing postoperative nausea and vomiting in patients who have had breast surgery under general anesthesia.

Methods: After ethical approval from institution review board, this randomized control was carried out at Liaqat national hospital and medical college. Seventy-four patients who completed the study's criteria and provided written informed permission were enrolled in a random order. Patients were recruited and then randomly assigned through balloting without replacement to one of two groups: (A) dexamethasone (n = 37) or (B) placebo (n = 37). After general anesthesia, patients in Group received 0.1mg/kg of dexamethasone intravenously at the same time. Patients in Group B received a placebo (2 ml of normal saline 0.9% at the same time following general anesthesia). Mean arterial blood pressure (MAP), heart rate (HR), respiration rate (RR), and the intensity of pain and vomiting was measured at 0 (in the operating room), 30, 60, and 120 minutes, and 4-, 6-, 12-, and 24-hours following surgery.

Results: The mean age of the participants in both study groups were 48.56±15.25 and 50.4±16.8 years. The mean anesthesia time of the participants in both study groups were 114±9.6 and 122.7±8.7 minutes. The mean surgery time of the participants in both study groups were 88.2±2.1 and 96.1±3.72 minutes. No significant difference in the heart rate (HR) was observed in both study groups at any time interval. A significant difference in the heart rate was observed in both study groups at 6-, 12-, and 24-hours' time interval. A significant difference in the heart rate was observed in both study groups at 0 and 30 minutes, 1-,2-,4-, 6-, 12-, and 24-hours' time interval.

Conclusion: There were no notable changes in vital signs associated with the use of intravenous dexamethasone for the treatment of postoperative pain, the need for rescue analgesia on postoperative day 1, or the occurrence of postoperative nausea and vomiting.

Keywords: Visual analog score, nausea, vomiting, pain, dexamethasone

INTRODUCTION

Strong anti-inflammatory glucocorticoids are sometimes used for temporary postoperative pain relief. This has the potential to enhance both heart rate (HR) and cardiac output by stimulating the autonomic nervous system (1). Patients' functional recovery may be slowed by acute postoperative discomfort, making surgical interventions less appealing (2). Glucocorticoids are potent anti-inflammatory drugs that may be used to manage pain after a variety of surgical procedures, but only for a limited duration. Dexamethasone, a glucocorticoid with little mineralocorticoid action, is widely used preoperatively to lessen the likelihood of postoperative nausea and vomiting (PONV) and play a helpful role in postoperative pain management. In addition to its anti-inflammatory and analgesic properties, dexamethasone also has an antiemetic effect (3). Glucocorticoids' exact mechanism of action is unknown, but some hypotheses put forth include a reduction in tissue swelling due to anti-inflammatory effects, a prevention of the reduction of the "pain threshold" that occurs during surgical procedures, and a reduction in inflammatory mediator production (4). Sedation, lethargy, mental clouding, gastrointestinal irritation, and respiratory depression are only some of the side effects that may be mitigated by decreasing the need for postoperative analgesics (opioids and nonsteroidal anti-inflammatory medicines). Procedures for the breast may vary from being very simple, like lumpectomies, to being quite difficult, like mastectomy followed by breast reconstruction. The majority of breast surgeries at Liaquat National Hospital and medical college, Karachi is performed due to breast cancer, the most frequent female malignancy. Pain, nausea, vomiting, seroma development, and chronic pain syndromes are common complications after breast surgery (5, 6). Between 34% and 65% of patients undergoing breast surgery report experiencing PONV (7). It has been observed that the incidence of PONV increases to between 60% and 80% if prophylactic anti-emetics are not given to women having mastectomy and axillary clearing (8). Because of its effectiveness, dexamethasone has long been the medicine of choice for preventing postoperative nausea and vomiting. Studies have demonstrated that dexamethasone is just as effective as other anti-emetics, including droperidol and ondansetron, for avoiding nausea and vomiting. Patients who were given dexamethasone had 26% less PONV, according to a research by Apfel et al.(9). Although dexamethasone has many positive benefits, many doctors are worried about its potential to increase blood sugar levels and wound infections (10, 11). Over a third of all postoperative patients suffered PONV, but only approximately 12% got therapy, according to a research conducted at Korle-Bu Teaching Hospital among adult patients having different surgical operations (12). In a resource-limited setting like Ghana, where cost of healthcare is a major factor for patients, the recommended first-line medications for PONV prophylaxis (5-HT3 antagonists like ondansetron) are unappealing due to their high cost. This research primarily aims to determine whether or not intravenous dexamethasone reduces postoperative nausea and vomiting in patients who have had breast surgery while under general anesthesia, with additional objectives including evaluation of postoperative pain.

METHODS

After ethical approval from institution review board, this randomized control was carried out at Liaqat national hospital and medical college. Patients in ASA classes I and II who were scheduled to have breast surgery in the Surgical Department between the ages of 14 and 60 (inclusive) were recruited in a sequential fashion. Patients with a history of motion sickness, PONV, or advanced breast disease undergoing palliative procedures (such as a toilet mastectomy), as well as those with a

known allergy to dexamethasone, a history of gestational diabetes or diabetes mellitus, chronic steroid therapy, immunosuppressed patients and patients on immunosuppressant drugs, and a history of being excluded from the study. Seventy-four patients who completed the study's criteria and provided written informed permission were enrolled in a random order. Patients were recruited and then randomly assigned through balloting without replacement to one of two groups: (A) dexamethasone (n = 37) or (B) placebo (n = 37). After general anesthesia, patients in Group received 0.1mg/kg of dexamethasone intravenously at the same time. Patients in Group B received a placebo (2 ml of normal saline 0.9% at the same time following general anesthesia). All of the patients got the same high level of pre- and post-operative care. Mean arterial blood pressure (MAP), heart rate (HR), respiration rate (RR), and the intensity of pain and vomiting was measured at 0 (in the operating room), 30, 60, and 120 minutes, and 4-, 6-, 12-, and 24-hours following surgery. With the use of a 10-centimeter ruler and a visual analogue scale (VAS), patients rated the intensity of their pain and nausea and vomiting. Patients was asked to rate their symptoms from 0 (no symptoms) to 10 (extreme symptoms) on a scale from 0 (no symptoms) to 10 (most severe symptoms). A score of 4 or below indicates minor discomfort, 5 to 7 indicates moderate, and 8 to 10 indicates severe pain and/or vomiting. All of the information we've gathered was entered into SPSS version 22 for thorough examination. Means and standard deviations were shown for quantitative variables such as age, body mass index, ASA-PS score, length of surgery, and pre-op blood pressure, heart rate, and oxygen saturation levels. Means and standard deviations was reported for the frequency with which intraoperative antiemetics are administered on demand to reduce the risk of postoperative nausea and vomiting and for pain ratings. A 95% confidence interval was provided for all treatment effects. We utilized t-tests for comparing the effects of dexamethasone to those of no dexamethasone, as well as 2 tests for comparing categorical variables and 2 tests for trending ordinal data.

RESULTS

Demographic and clinical parameters of the participants in study group A (Dexamethasone) and B (Normal Saline) is presented in Table 1. The mean age of the participants in both study groups were 48.56±15.25 and 50.4±16.8 years. No significant difference (P=0.631) in the mean ages of the participants in both study groups was observed. The mean weight of the participants in both study groups were 64.56±8.7 and 63.9±8.2 Kg. No significant difference (P=0.768) in the mean weights of the participants in both study groups was observed. The mean anesthesia time of the participants in both study groups were 114±9.6 and 122.7±8.7 minutes. A significant difference (P=0.000) in the mean anesthesia time of the participants in both study groups was observed. The mean surgery time of the participants in both study groups were 88.2±2.1 and 96.1±3.72 minutes. A significant difference (P=0.000) in the mean surgery time of the participants in both study groups was observed.

Table 1: Demographic and clinical parameters of the study participants in study groups

Parameters	Dexamethasone (n=37)	Saline (N=37)	P Value
Age (years)	48.56±15.25	50.4±16.8	0.631
Weight (kg)	64.56±8.7	63.9±8.2	0.768
ASA Class			
I	7	8	
II	28	25	
III	2	3	
Anesthesia Time (minutes)	114±9.6	122.7±8.7	0.000
Surgery time (minutes)	88.2±2.1	96.1±3.72	0.000

Table 2 and Figure 1 represent Mean±S.D of heart rate of the participants in both study groups. No significant difference in the heart rate (HR) was observed in both study groups at any time interval. Table 3 and Figure 2 represent Mean±S.D of Mean Arterial Pressure (MAP) of the participants in both study groups. A significant difference in the heart rate was observed in both study groups at 6-, 12-, and 24-hours' time interval. Table 4 and Figure 3 represent Mean±S.D of Visual analog score (VAS) of the participants in both study groups. A significant difference in the heart rate was observed in both study groups at 0 and 30 minutes, 1-,2-,4-, 6-, 12-, and 24-hours' time interval. The participants showed a significant (p=0.012) incidence of vomiting/nausea in normal saline group as compared to dexamethasone group (Table 4).

Table 2: Comparison of heart rate at different time intervals in the study groups

HR	Dexamethasone (n=37)	Saline (N=37)	P Value
0 min	68.02±8.1	67±10.1	0.641
30 min	67.8±12.4	69.8±8.5	0.356
1 hour	70.24±7.4	69.5±7.5	0.702
2 hours	71.5±6.7	71.4±6.9	0.986
4 hours	70.4±6.3	72.4±7.21	0.284
6 hours	70.8±6.4	73.5±7.21	0.114
12 hours	71.3±6.6	74.16±7.3	0.098
24 hours	70.5±6.9	72.81±6.9	0.19

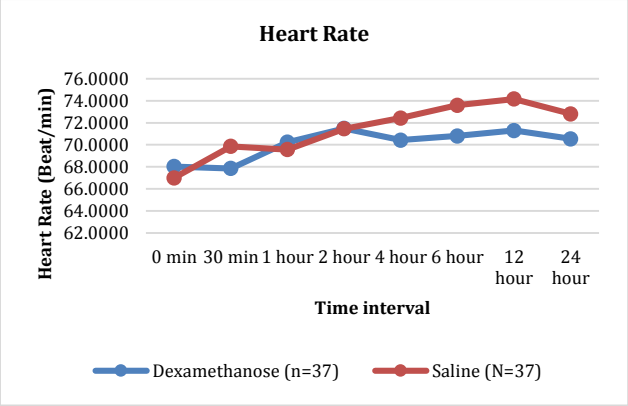

Figure 1: Graph depicting comparison of heart rate between the two groups in post-operative period

Table 3: Comparison of mean arterial pressure at different time intervals in the study groups

MAP	Dexamethasone (n=37)	Saline (N=37)	P Value
0 min	73.3±5.3	77.3±8.5	0.36
30 min	73.9±4.5	76.3±8.0	0.125
1 hour	73.9±3.9	75.7±5.4	0.1
2 hours	74.3±3.9	75.0±6.05	0.567
4 hours	73.8±3.5	75.8±5.8	0.88
6 hours	73.2±3.8	76.9±4.7	0.000
12 hours	71.7±3.1	77.5±5.4	0.000
24 hours	71.7±3.04	79.0±5.86	0.000

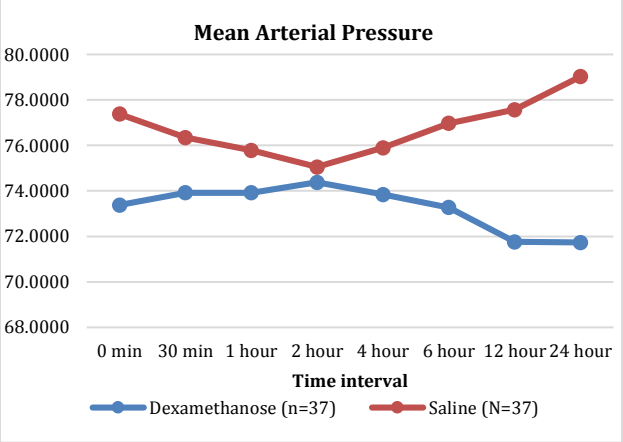

Figure 2: Graph depicting comparison of mean arterial pressure between the two groups in post-operative period

Table 4: Comparison of visual analog score at different time intervals in the study groups

VAS Score	Dexamethasone (n=37)	Saline (N=37)	P Value
0 min	2.54±0.5	2.54±0.5	0.000
30 min	2.54±1.38	2.54±1.38	0.000
1 hour	2.56±1.38	2.56±1.38	0.000
2 hours	2±0.00	3.73±1.50	0.000
4 hours	2±0.00	4.05±1.52	0.000
6 hours	2±0.00	4±1.58	0.000
12 hours	2±0.00	3.89±1.42	0.000
24 hours	2±0.00	3.95±1.59	0.000

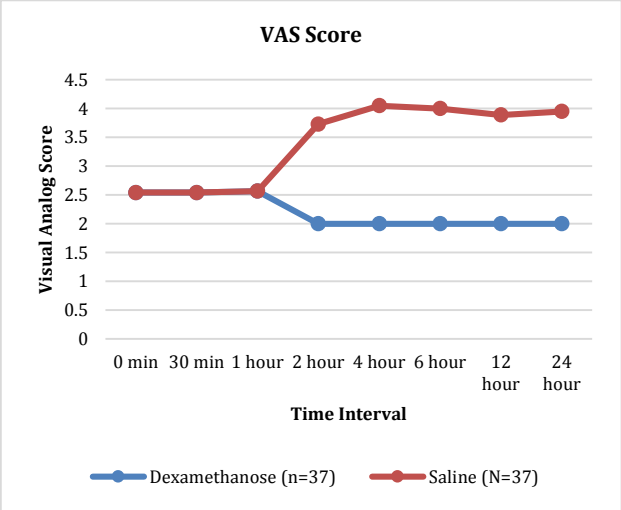

Figure 3: Graph depicting comparison of visual analog score between the two groups in post-operative period

Table 5: Comparison of incidence of vomiting at different time intervals in the study groups

Incidence of vomiting	Dexamethasone (n=37)	Saline (N=37)	P Value
Yes	8	12	0.012
No	29	25	

DISCUSSION

Since Apfel et al. understood that the dread of PONV is considerably larger than postoperative pain, preoperative interviews have been a crucial part of preventing PONV (13). Prophylactic dexamethasone following total hip arthroplasty has been shown in a recent comprehensive review to reduce the risk of postoperative nausea and vomiting (PONV) compared to placebo (14). When compared to other types of surgical procedures, the risk of postoperative nausea and vomiting (PONV) is much higher with a mastectomy done under general anesthesia. Our findings provide the first direct comparison at our hospital between dexamethasone and placebo for the prevention of PONV after mastectomy. We also found that the rate of PONV was significantly greater in the placebo group than in the dexamethasone group. We compared the postoperative pain and PONV scores of patients who were given IV dexamethasone to those who were given a placebo (normal saline 0.9%). The findings of the present research were consistent with those of the vast majority of earlier studies that have shown the beneficial analgesic impact of dexamethasone after a variety of surgical procedures(4, 15). This study's findings are consistent with those of Jokela et al. and Hongs et al., who also discovered that post-cesarean administration of dexamethasone reduced the requirement for morphine and other analgesics (16). Antiemetic dexamethasone works by blocking the release of neurotransmitters endorphin and enkephalin, as well as the gastrointestinal hormones prostaglandin and serotonin (17). Although the minimal dose of dexamethasone has been reported from 2.5 mg for gynecologic procedures to 5 mg for thyroidectomy, the impact of varying doses of glucocorticoids on decrease of PONV has been observed in several studies(18, 19). After a caesarean section under spinal anesthesia and morphine, Cardoso et al. (2013) found that dexamethasone decreased the cumulative incidence of nausea and vomiting on the first postoperative day and decreased pain ratings (20). The research by Shahraki et al. (2013) found that dexamethasone effectively mitigated postoperative pain, decreased the requirement for painkiller use, and boosted vital signs after caesarean delivery (21). 2014 research by Mohtadi et al. found that compared to a placebo, a single dose of IV dexamethasone resulted in reduced pain severity and meperidine intake (3). Kadur et al. found in their 2016 research that preemptively administering IV dexamethasone (0.1 mg/kg) before to subarachnoid block improves postoperative analgesia and decreases the occurrence of PONV (22). An additional source of distress is pain experienced after a mastectomy. Our meta-analysis mostly relies on the VAS rating. Dexamethasone was shown to be ineffective in reducing pain after total knee arthroplasty, as demonstrated by Christensen et al (23). Nonetheless, our statistical findings are consistent with those of Xu H et al (24), who demonstrated that intravenous injection of dexamethasone may greatly decrease postoperative pain. Our meta-analysis found that dexamethasone was effective in reducing the VAS score for postoperative pain in the first few hours after mastectomy, but had no effect beyond 24 hours.

CONCLUSION

It has been shown that intravenous dexamethasone given after spinal anesthesia decreases surgical pain, the need for rescue analgesia on postoperative day one, and the occurrence of postoperative nausea and vomiting (PONV) without significantly altering vital signs.

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