

Comparison of the Antiemetic Effects of Metoclopramide and Dexamethasone in Women Undergoing Cesarean Section Under Spinal Anesthesia

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ABSTRACT

It is well known that the most common problems faced by patients who receive spinal anesthesia for cesarean section (C/S) are nausea and vomiting. It turns out that 8 mg of intravenous (IV) dexamethasone versus 10 mg of intravenous metoclopramide has potent action to reduce the incidence of these two troubles. Additionally, changes in vital signs were checked in the present study. The categories of our study were chosen based on ASA I and II classifications, with ages ranging from 18 to 40 years old with a BMI between 18 and 25. The total number of pregnant patients was 80. The patients were randomly classified into either Group M (n=40) receiving 8 mg of IV dexamethasone or Group N (n=40) obtaining 10 mg of metoclopramide intravenously. Following 8 mg of dexamethasone or 10 mg of metoclopramide, heart rate, SPO₂%, arterial arterial pressure, and the frequency of nausea or vomiting were recorded at 1, 5, 10, 15, 30, and 60 minutes for all categories of both groups. For spinal anesthesia, 12.5 mg of bupivacaine 0.5% was administered intrathecally for both groups. After complete monitoring and checking, the findings suggest that age, BMI, and SPO₂ were non-significantly changed due to the selection of dexamethasone or metoclopramide. However, the impacts of these antiemetics on patients' hemodynamics and nausea and vomiting were significantly influenced after administration of spinal anesthetic. The study concluded that dexamethasone and metoclopramide, during cesarean delivery, revealed significant differences in the frequency of nausea and vomiting, heart rate, and arterial blood pressure between the two groups. Metoclopramide showed the lowest baseline mean frequency of nausea and vomiting at all time points, while dexamethasone represented the highest baseline mean for mean arterial pressure (MAP) and pulse rate (PR) according to the monitoring time points selected. In order to maximize patient outcomes following cesarean birth, healthcare providers should carefully take these considerations into account while choosing medications.

Keywords: cesarean section, spinal anaesthesia, nausea and vomiting, dexamethasone, metoclopramide

1. INTRODUCTION

The medical procedure known as a "cesarean section," or "C-section," involves cutting the mother's uterus and abdominal wall in order to deliver the baby. When a vaginal delivery is not feasible or might put the mother or the unborn child in danger, the operation is usually used [1]. Although the incidence of cesarean deliveries has increased dramatically in most industrialized countries over the past few decades, countries, regions, or even hospitals in the same location with similar socioeconomic profiles and patient characteristics may differ significantly.[2]. The selection of an anesthetic approach for surgery involves a complex decision-making process that requires consideration of the patient's medical history, surgical requirements, and potential risks and benefits of each type of anesthesia. Anesthetic approaches can broadly be divided into two categories: general anesthesia and regional anesthesia [3]. General anesthesia is a technique that induces a state of unconsciousness in the patient, leading to a loss of sensation and memory. It involves the administration of anesthetic agents via intravenous injection or inhalation [4]. By injecting local anesthetics into certain nerves or nerve clusters, regional anesthesia causes a particular portion of the body to lose its ability to feel and use its muscles. There are three types of regional anesthesia: spinal, epidural, and peripheral nerve blocks. While local anesthetics are injected into the cerebrospinal fluid during spinal anesthesia, they are injected into the epidural space during epidural anesthesia. [5,6]. The most popular method for elective cesarean sections is spinal anesthesia. It develops quickly and creates a thick block. [7]. Postoperative nausea and vomiting (PONV) is a common postoperative unpleasant experience [8]. Nausea and vomiting (N/V) are common symptoms that may occur as chronic or recurrent conditions but are often difficult to manage. Nausea and/or vomiting occur in various clinical situations, such the post-operative phase, and are frequently linked to the application of chemotherapy drugs or as a consequence of gastrointestinal illnesses or dysfunctions,

such as abnormalities of motility. Some individuals have nausea and vomiting for no obvious reason. [9]. Anesthesia or analgesia to relieve pain during surgery can also induce nausea and vomiting. Spinal anesthesia produces sympathetic, sensory, and motor blocks [10].

The gastrointestinal (GI) tract's chemoreceptors and mechanoreceptors are sensitive to a variety of mechanical (distension) and chemical (acids, irritants, and poisons) stimuli. This signal is sent to the emesis center via afferent fibers, mostly through vagal pathways. Enterochromaffin cells (ECCs), which produce mediators that activate the vagal pathways, are responsible for detecting these stimuli [11]. Cholecystokinin (CCK), substance P acting on the NK1 receptor, and 5HT acting on the 5HT3 receptor are among the many chemical mediators at play. The effects of these first mediators are amplified or diminished by a variety of other mediators. For example, acetylcholine (M3 receptors), norepinephrine (β receptors), histamine (H2 receptors), and 5HT itself enhance 5HT release, but GABA (GABA-B receptors), VIP, and somatostatin restrict 5HT release from the ECCs. [12]. A host of antiemetic medications are based on the interaction of these chemical mediators. Nevertheless, the functions of the enteric nervous system, autonomic nervous system, and peripheral nervous system are still unclear as etiologies of N/V, whether or not they originate in the GI tract. [13].

Dexamethasone is a synthetic steroid that has long been used to prevent and cure nausea and vomiting brought on by chemotherapy. Additionally, postoperative nausea and vomiting (PONV) prevention and therapy have been authorized as conventional uses for it [14]. For patients undergoing different chemotherapy regimens, dexamethasone was accidentally shown to have an impact in lowering postoperative nausea and vomiting [15]. Although dexamethasone is a powerful antiemetic medication, its effectiveness at low doses (5 mg) on the prophylaxis of postoperative nausea and vomiting (PONV) in patients undergoing laparoscopic cholecystectomy has not been evaluated [16].

Metoclopramide is a dopamine receptor antagonist that can be administered prophylactically to prevent nausea and vomiting in postoperative patients [17]. Metoclopramide (MCP), a central and because it can counteract dopamine's vasodilator and natriuretic actions, a peripheral dopaminergic blocker with cholinergic activity has been suggested as a treatment for orthostatic hypotension (OH) [18]. The study's objective was to ascertain how metoclopramide and dexamethasone affected post-spinal nausea and vomiting in women undergoing cesarean sections under spinal anesthesia.

2. METHODS AND MATERIALS

Design of study : - this study was interventional comparative study to determine the decreasing ((the expecting nausea and vomiting that happened post spinal injection for women undergoing cesarean section)) by choosing either (Dexamethasone) or (Metoclopramide) .

Data collection and Sample study

The study covers 80 participants ((The age)) with a range between (18-40 years). And according to Body Mass Index ((BMI)), ASA (I & II)) (18–25) While some. The majority of the research sample underwent spinal anesthesia at the patient's choice, and clinicians selected caesarean sections with spinal anesthesia. Most of them are having their first delivery operation, although some have undergone a previous cesarean section. Two groups were randomly selected from among the categories. Group N was given 10 mg of intravenous metoclopramide, while Group M was given 8 mg of intravenous dexamethasone. Vein punctures were used to collect blood samples both before and during the surgery. Red blood cells (RBCs), white blood cells (WBCs), platelets (Plts), and hemoglobin concentration (Hb) were all tested using Sysmex Kx21, and the findings were recorded.

Every category in this trial received an IV cannula gauge (20 or 24). As soon as the patients entered the operation room, routine monitors were attached, including blood pressure, pulse rate, spasm, and body temperature, which were measured using a sphygmomanometer, pulse oximeter, and thermometer, respectively. Following cannulation, the patients were moved to an operating table and given spinal anesthesia in the proper posture, creating a line between the iliac crests. The spinous process at the level of this line in interspace has been determined to be L3/4. Insert a 25 G pencil-point spinal needle gauged in the midline (coronal plane) at the level of the interspace. Advance to a depth of around 4–6 cm with a 15° cephalad angulation until a click or pop is felt. Proceed until you hear a pop or click. Connect the syringe with 12.5 mg of LA (bupivacaine 0.5%) when the CSF has flowed freely, then the patient is put in the supine position with oxygenation and frequent measurement of blood pressure, pulse, and respiratory rates. After intrathecal administration for both groups (M&N) . After administration of that, {{ (8mg) of dexamethasone was given for (M group) }} or

{{ (10 mg) of metoclopramide was given for (N group) }}. The frequency of either nausea or vomiting & Monitoring of , heart rate, SPO2%, and Mean Arterial pressure were documented to all categories of this study were recorded at the first 5, 10, 15, 30, and 60 minutes. Using a specially designed questionnaire and the patient's medical record, the presence of post-operative adverse effects, such as pain, headache, and vomiting, was determined.

Location of Study

Between the period(first of November 2024 to the end of January of 2025). This study was conducted at Imam Hassan Al-

Mujtaba Teaching Hospital in Karbala, Iraq. This hospital serves Karbala's population, whose number is estimated at 900 thousand persons according to the last census in 2016. The average age of the population is 36 years, and about 40% of them are of reproductive age. Iraq was reported to have a growth rate of 2.34% in 2022, with an average of 3,174 births occurring daily across the country

Statistical Analysis

The Validity of the Questionnaire

Instruments	Score	No. of items	Cronbach's Alpha	Assessment
Perception	test	8	0.09	Reliable

To ascertain the instrument's content validity, a panel of specialists examined and assessed the suitability, applicability, and clarity of the questionnaire in order to fulfill the objectives of the study. The Dependability of the Questionnaire Utilizing version 20.0 of the Statistical Package for Social Science Program (SPSS), the alpha correlation coefficient was calculated to assess the questionnaire's internal consistency in order to assess the instrument's reliability. and Microsoft Excel. The result of the reliability for the study instrument It is statistically acceptable which indicates that the questionnaires were done in an adequate level of internal consistency and equivalence measurability.

3. RESULTS

The study aimed to compare of two types of antiemetic drugs (Metoclopramide) and (Dexamethasone) and during cesarean section for patients who got spinal anesthesia The arrangement of the variables was recorded in the tables forms

Table (1) displays the mean MAP for both groups. The significant p-value is bolded. After 60 minutes of surgery, the mean MAP in the M group increased to 62.2 with a significant value of $P < 0.05$, whereas the mean 30 minutes in the N group was 35.2.

Mean Arterial Pressure (MAP) Change by Study Group (Table 1)

MAP	M group		N Group		p value
	Mean	SD	Mean	SD	
Map-base	31.2	7.1	31.1	7.1	0.08
Map-1 min	33.4	7.6	33.3	7.5	0.09
Map-5 min	30.7	6.9	34.2	7.9	0.12
Map-10 min	32.6	7.3	34.6	7.9	0.11
Map- 30 min	51.6	14.3	35.2	8.2	0.05
Map- 60 min	62.2	15.1	39.5	9.1	0.03

*means the significant at 5% level of significance ($p < 0.05$)

Table 2 and the mean frequency of nausea and vomiting in both groups is displayed in Chart G. The significant p-value is bolded. From the beginning of infusion until 60 minutes MAP (24.9), there was a substantial decrease in nausea and vomiting in the N group, with a statistically significant p value of less than 0.05.

Table 2: Change in Mean at Nausea and Vomiting between study groups

MAP	M group		N Group		p value
	Mean	SD	Mean	SD	
MAP- base	80.1	6.9	76.3	6.2	0.06
MAP-1 min	62.0	4.2	47.9	3.2	0.14
MAP-5 min	61.9	4.1	47.7	3.1	0.07

MAP-10 min	61.7	4.1	47.4	3.1	0.06
MAP- 30 min	61.5	4.1	47.0	3.1	0.05
MAP- 60 min	40.4	2.8	24.9	1.8	0.025

Note* indicates significance at the 5% level ($p < 0.05$).

The Mean PR for both groups is displayed in Table 3 and Chart H. The significant p-value is bolded. From the beginning of the infusion until 60 minutes, the M group saw a substantial impact on PR, with a statistically significant p value of less than 0.05.

Table 3: Variation in the Mean at PR among the research groups

MAP	M group		N Group		p value
	Mean	SD	Mean	SD	
MAP-base	110.7	4.6	90.2	3.8	0.07
MAP-1min	120.6	5.2	100.2	4.3	0.065
MAP-5min	150.4	8.2	134.2	6.9	0.07
MAP-10 min	154.6	8.4	145.7	7.6	0.06
MAP-30 min	155.3	8.3	150.6	8.2	0.04
MAP-60 min	160.1	10.1	152.4	8.1	0.03

Note: * indicates significance at the 5% level ($p < 0.05$).

4. DISCUSSION

According to the results that found in this study we noticed that the Mean Arterial Pressure, Nausea & Vomiting, Pulse Rate, are different at some time points due to receiving IV Metoclopramide or of IV dexamethasone, show highest Mean Arterial Pressure (MAP) at 30, 60 minutes after administration of dexamethasone, and standard deviation shows higher at same time of increasing of MAP values at (M group). And for Nausea and Vomiting Variable we saw that decreasing of their frequency values is clear at all time points in (N group) as compare with the other study group & standard deviation shows lowest value at same time for decreasing of nausea and vomiting frequency at (N group).

When administered as a single 4–10 mg intravenous dosage for postoperative nausea and vomiting prevention, dexamethasone causes temporary postoperative hyperglycemia in diabetic individuals having elective surgery (19). In the post-anesthesia care unit and during the first 24 hours following laparoscopic gynecological procedures, preventive dexamethasone treatment reduces the incidence of nausea and vomiting. However, dexamethasone can significantly raise systolic blood pressure (20). Therefore, blood pressure levels need to be monitored on a frequent basis, regardless of the postnatal age at which dexamethasone is delivered (21). According to the findings, fetal heart rate variation often increases for up to a day after maternal dexamethasone dosing (22). Following an injection of metoclopramide, there were two phases of an increase in muscle sympathetic nerve activity. The study found that high-dose oral and IV regimens of metoclopramide have comparable antiemetic effectiveness in previously untreated patients receiving 60 mg/m² cisplatin (24), despite a negative connection between mean blood pressure and muscular sympathetic nerve activity (23). This implies that the unloading of arterial baroreceptors may have caused the first rise in sympathetic nerve activity.

5. CONCLUSION

In the conclusion

Finally, our analysis confirms that For women who had spinal anesthesia, the administration of various antiemetic medications alters the hemodynamic factors (mean arterial pressure, pulse rate), as well as nausea and vomiting. The results indicate that while the selection of dexamethasone and metoclopramide did not substantially alter age, body mass index (BMI), or SPO₂, the effects of these antiemetics on the patient's hemodynamic indicators were

the observed values of ((MAP, Pulse rate and decreasing of nausea and vomiting)) indicating heterogeneity in their effects.

Dexamethasone generally resulted in higher levels of ((MAP)) at 30 & 60 minutes after administrations of Dexamethasone, values of ((nausea and vomiting)) frequency are lower levels at 60 minutes after administrations of Metoclopramide

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