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Intravenous (IV) Dexamethasone in Prolonging the Duration of Subarachanoid Block in Pregnant Patients Undergoing Lower Segment Cesarean Section (LSCS)

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Author`s Contribution

[1,3]Substantial contributions to the conception or design of the work; or the acquisition, [4,5]Final Approval [1,2]Drafting the work or revising it critically for important intellectual content, [6]Active participation in active methodology, analysis, or interpretation of data for the work,

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ABSTRACT

Objective: This double-blind randomized controlled trial evaluated the role of 8 mg of Intravenous IV Dexamethasone in prolonging the duration of analgesia offered by spinal anesthesia in patients undergoing Cesarean Section.

Methodology: This RCT was carried out department of Anesthesia, BBH, Rawalpindi from 20th July, 2025 to 20th October,2025. The study enrolled 110 patients who fulfilled the inclusion criteria i.e.16 years to 40 years of age, American Society of Anesthesiologists (ASA) class: II presenting for elective Cesarean section under Spinal Anesthesia. After Sub-arachnoid block patients in group D received 8mg of IV Dexamethasone as a single dose while patients in group C received placebo. Time for block to regress by two dermatomes, time for first demand to rescue analgesia, incidence of intraoperative shivering, nausea and vomiting between two groups were noted and compared.

Results: Intravenous dexamethasone significantly prolonged the median time to rescue analgesia [6.95 vs. 3.56 hours, p<0.001] and delayed regression by two dermatomes [125 vs. 88 minutes, p<0.001] compared with placebo. Furthermore, the incidences of intraoperative nausea and vomiting (9.1% vs. 36.4%, p=0.001) and shivering (30.9% vs. 60.0%, p=0.002) were significantly reduced in the dexamethasone group.

Conclusion: Single dose of 8mg of IV Dexamethasone significantly prolongs the duration of Sub-Arachnoid block in terms of time for block to regress by two dermatomes, time to first rescue analgesia and decreased incidence of intraoperative shivering, nausea and vomiting in patients undergoing Cesarean section.

Keywords: Sub-Arachnoid Block, IV Dexamethasone, Rescue analgesia, Post spinal shivering, Intraoperative nausea and vomiting.

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Introduction

Cesarean section commonly known as C section is one of the commonly performed surgical procedure. Among pregnant patients, 19.6% had C-section between 2017-18.[1] C section is carried out in neuraxial block, most commonly Sub-Arachnoid Block as it avoids systemic administration of drugs which can adversely affect the newborn. However spinal anesthesia is a single shot regional anesthetic technique with its effects being short lived. As block regresses in the post-operative period, Intravenous (IV) analgesics have to be given to increase maternal comfort. Among Intravenous analgesics, Paracetamol

is a safe option with no potential adverse effect on mother and newborn. Apart from Paracetamol, drugs which are frequently used to manage perioperative pain include Non-steroidal anti-inflammatory drugs (NSAIDs) and Opioids. Non-steroidal anti-inflammatory drugs (NSAIDs) are associated with a number of side effects such as gastritis, renal dysfunction, platelet dysfunction, pre mature closure of ductus arteriosus in breast fed newborn.[2] Among breast feeding mothers, Ibuprofen is a preferred NSAID as it has been found to be present in minimal amounts in breast milk.[3] However, Ibuprofen has limited availability. On the other hand Intravenous (IV) Ketorolac is commonly available and is also considered a relatively safe drug in breast feeding mothers.[4] Opioids are generally be avoided in post-partum period, as they are secreted in milk and can adversely affect newborn. They should be used to manage acute severe pain and for shortest possible time.[4] Therefore, post operative pain management options are limited in breast feeding mothers. This poses unique challenge to manage pain effectively in the immediate post-partum period. One way to improve patient comfort in the immediate post-partum period is to increase the duration of neuraxial block. Adjuvants can be added to intra-operative patient management plan to increase the duration of Sub-Arachnoid block. Various examples of adjuvants include Ketamine, Opioids, Dexamethasone and Dexmedetomidine. Among these Ketamine usage is associated with psychotic reactions, agitation, nausea and vomiting.[5]

Opioids when added intrathecally can improve the quality of Sub-Arachnoid Block (SAB) but are associated with nausea, vomiting and pruritis.[6] Dexmedetomidine is also an effective adjuvant and it can prolong the duration of analgesic effects of spinal anesthesia for up to 24 hours.[7,8] However, Dexmedetomidine is an expensive drug with limited availability that is also associated with side effects of hypotension and bradycardia.[9] Dexamethasone is another adjuvant that is widely available and has no. of uses in the peri-operative period. It is used as an analgesic, anti-inflammatory, anti-emetic and as adjunct to prolong the duration of regional anesthesia.[10]

Dexamethasone can be given intravenously to prolong the duration of sub-arachnoid block. It was found that administration of 8 mg of Intravenous IV Dexamethasone in 500 ml of Normal Saline before administration of Spinal anesthesia effectively prolongs the duration of spinal anesthesia in terms of time to rescue analgesia, sensory and motor block regression.[11,12,13] However in another recent randomized controlled trial, administration of 8 mg of IV Dexamethasone before spinal anesthesia was found to be ineffective in prolonging the duration of spinal anesthesia in terms of time to first rescue analgesia and time for block to regress by two dermatomes.[14] Similarly 4 mg of IV Dexamethasone was found to be ineffective to prolong the analgesic effects of Sub-arachnoid block.[15] Furthermore in a recent review of literature, it was recommended that further trials should be conducted so that optimal dose and timing of IV Dexamethasone administration can be determined which will result in prolong analgesic effects of sub-arachnoid block.[16] As there is heterogeneity of literature regarding Intravenous IV Dexamethasone to prolong the duration of spinal anesthesia among patients undergoing lower segment C section this randomized control was carried out to determine the beneficial effects of single dose of 8mg of IV Dexamethasone administered to the patients undergoing C section under sub-arachnoid block.

Methodology

This Double Blind Randomized Controlled Trial was carried out at Department of Anesthesia and Critical Care Medicine, Benazir Bhutto Hospital, Rawalpindi from 20th July 2025 to 20th October 2025. An institutional ethical approval was taken Ref no 201/IREF/RMU/ 2025 and trial was registered (NCT07088146). The study enrolled 110 patients with sample size calculated according to Open Epi Calculator by taking Confidence Interval = 95%, Power of test = 90%, Mean time for sensory block to regress by two dermatomes in group 1: 91.45 ± 7.45 minutes (11), Mean time for sensory block to regress by two dermatomes group 2: 87.85± 5.91 minutes(11). The patients fulfilling the inclusion criteria i.e. 16 years to 40 years of age, American Society of Anesthesiologists (ASA) class: II presenting for elective Cesarean section under Spinal Anesthesia were enrolled and divided equally into two groups using computer generated random numbers. While patients with Gestational diabetes, Body mass index >35 kg/m2, Diabetes mellitus, Adrenal insufficiency, chronically receiving steroids, allergy to study medications and having sensory block level less than T4 were excluded from the study. Upon arrival in the OR, standard ASA monitoring was attached and spinal anesthesia was induced with 25G Quincke spinal needle using 12.5 mg of 0.75% Bupivacaine. Group D patients received 8 mg of Dexamethasone intravenous i.e., 2ml just after administration of spinal anesthesia while Group C patients received equal amount of intravenous IV Saline. Time of surgery as well as time for block to recede by 2 dermatome levels was noted. Time for first rescue analgesic demand was also noted. The incidence of intraoperative shivering along with nausea and vomiting was be noted.

Results

Baseline profile was comparable across two groups. Mean age of presentation in group D was 28.76 ± 2.701 years while in group C it was 29.25 ± 2.34 years with p value being 0.330. All patients were labelled as ASA II. Duration of surgery was also similar across two groups with duration being 56.65 ± 7.80 minutes in group D while it being 55.53 ± 7.69 years in group C with p value being 0.444.

Quantitative data was checked for normality and it was found to have non-parametric distribution. A comparison between two groups is shown in following table I. A comparison of incidence of intraoperative shivering, nausea and vomiting across two groups is shown in table II.

Table I: Comparison of Non-parametric variables across two groups.

Variable	Group D (n=55)	Group C (n=55)	P value (Mann Whitney U test)
Time to rescue analgesia (hours), Median (IQR)	6.95 (0.94)	3.56 (0.51)	<0.001
Regression by 2 dermatomes (minutes), Median (IQR)	125 (10)	88 (9)	<0.001

Table II: Comparison of incidence of Intraoperative Nausea vomiting and Shivering across two groups.

Variable	Group D (n=55)	Group C (n=55)	P value (Chi Square test)
Intraoperative nausea and vomiting, n (%)	5 (9.1%)	20 (36.4%)	0.001
Intraoperative shivering, n (%)	17 (30.9%)	33 (60.0%)	0.002

Discussion

The present study reveals that single dose of intravenous dexamethasone 8 mg administered immediately after sub-arachnoid block significantly prolongs the duration of sensory blockade and time to rescue analgesia in patients undergoing cesarean section under spinal anesthesia with 12.5 mg hyperbaric bupivacaine. The median time to rescue analgesia was significantly longer in the dexamethasone group compared with the placebo group [6.95 (IQR 0.94) vs. 3.56 (IQR 0.51) hours, p<0.001].

The median time to rescue analgesia was found to be significantly longer in Dexamethasone group that was 6.95 (IQR 0.94) hours while it was 3.56 (0.51) hours in control group with p value being <0.001. The findings are similar to those reported by Abdel-Wahab et al., who evaluated the effect of intravenous dexamethasone on duration of hyperbaric bupivacaine spinal anesthesia in patients undergoing lower abdominal surgery.[11] Abdel-Wahab et al., reported mean time to rescue analgesia in dexamethasone group was 4.65 ± 1.58 hours while it was 3.80 ± 1.52 hours in control group with p value of <0.001.[11] Therefore, our findings are comparable to those reported in literature. However, the population studied by Abdel-Wahab et al. included lower abdominal procedures other lower segment Cesarean section and majority of their study participants were male.[11] Similarly Gurmu et al., investigated the postoperative analgesic effects of intravenous dexamethasone in cesarean section patients under spinal anesthesia.[17] Gurmu et al., reported a significant increase in time for first rescue analgesia demand in the dexamethasone group compared with placebo.[17] The median time to rescue analgesia in Dexamethasone group was of 347.5 (320–360) minutes i.e. 5.79 hours while in normal saline group median time to rescue analgesia was 230 (192.5–240) minutes i.e. 3.83 hours.[17] These findings are again similar to our study. Both this study and that done by Gurmu et al., reveals a two-fold increase in time to rescue analgesia demand when IV Dexamethasone is given to patients undergoing Lower segment Cesarean section under spinal anesthesia. Similarly Ravishankar et al., reported that time to first rescue analgesia in placebo group was 240 minutes i.e. 4 hours while it was 510 minutes i.e. 8.5 hours in Dexamethasone group with the difference being significant that is p value being less than 0.05.([18] The slightly greater time duration to first rescue analgesic demand as mentioned by Ravishankar et al., in comparison to our study can be due to addition of 20 Mcg of Fentanyl to intrathecal Bupivacaine by Ravishankar et al.[18] Never the less this study without using intrathecal fentanyl i.e. a drug not widely available still showed a significantly increased time to first rescue analgesic demand while using a simpler, readily available and a cheaper drug providing an excellent insight to improve peri-operative maternal comfort.

The present study shows that addition of 8 mg of IV Dexamethasone to sub-arachnoid block significantly increases the time for sensory block to regress by two dermatomes. Time for block to regress by two dermatomes in control group was 88 (9) minutes in the placebo group while it was 125 (10) minutes in the dexamethasone group. This is particularly useful in difficult obstetric cases where surgical time can be considerable and therefore intraoperative block regression can lead to maternal discomfort. Never the less this effect should be checked in further randomized control trials targeting potentially prolong surgical procedures in obstetric population. Similar to our study, time for block to regress by second dermatome was 91.45 ± 7.45 minutes in Dexamethasone group while it was 87.85 ± 5.91 minutes in Control group with p value being <0.001.[11] Similarly time for block to regress by two dermatomes was found to be 90 minutes in placebo group while it was found to be 150 minutes in Dexamethasone group.[18]

In contrast to our findings, Manohar et al. reported no significant benefit of intravenous dexamethasone on the duration of spinal anesthesia in terms of time for block to regress by two dermatomes as well time to demand of first rescue analgesia in the post-operative period.[14]

Furthermore, Dexamethasone was found to significantly improve maternal satisfaction by reducing the incidence of intraoperative shivering, nausea and vomiting. The incidence of intraoperative nausea and vomiting decreased from 36.4% in the control group to 9.1% in the dexamethasone group, while shivering decreased from 60.0% to 30.9%. Similarly, a significantly lower incidence of nausea and vomiting in Dexamethasone group was reported by Abdel-Wahab et al.[11]

Never the less this study shows the 8mg of IV Dexamethasone administered to obstetric patients undergoing Lower segment Cesarean section under spinal anesthesia significantly prolongs the time for block to regress by two dermatomes as well as it increases the time to first rescue analgesia and maternal satisfaction by decreasing the incidence of intraoperative shivering, nausea and vomiting.

Conclusion

Single dose of 8mg of IV Dexamethasone significantly prolongs the duration of Sub-Arachnoid block in terms of time for block to regress by two dermatomes, time to first rescue analgesia and decreased incidence of intraoperative shivering, nausea and vomiting in patients undergoing Cesarean section.

Limitations of the study: The study failed to evaluate the effect of single dose of IV Dexamethasone on duration of motor block. Furthermore, this is a single center study and further multi center randomized control trials are needed.

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