



Comparison of Post Operative Analgesic Efficacy Between Dexmedetomidine with Levobupivacaine Versus Dexmedetomidine with Ropivacaine in Ultrasound Guided Transversus Abdominal Block for Total Abdominal Hysterectomy Surgeries in a Tertiary Care Hospital in Chengalpattu District – A Randomized Control Trial

Dr. M. Madhu Balan¹, Dr. Krishna Prasad.², Dr. Dilip Kumar G.³, Dr. Anusha Balasubramanian^{4*}, Dr. Varun⁵; Dr. Hema S.⁶

¹3rd year Post Graduate, Department of Anesthesia, Shri Sathya Sai Medical College and Research Institute, Ammapettai, Chengalpattu District, Tamil Nadu, 603108 India.

²Professor, Department of Anesthesia, Shri Sathya Sai Medical College and Research Institute, Ammapettai, Chengalpattu District, Tamil Nadu, 603108 India.

³Professor, Head of the department, Department of anesthesia, Shri Sathya Sai Medical College and Research Institute, Ammapettai, Chengalpattu District, Tamil Nadu, 603108 India.

⁴Professor, Department of anesthesia, Shri Sathya Sai Medical College and Research Institute, Ammapettai, Chengalpattu District, Tamil Nadu, 603108 India.

⁵Senior Resident, Department of anesthesia, Shri Sathya Sai Medical College and Research Institute, Ammapettai, Chengalpattu District, Tamil Nadu, 603108 India.

⁶Senior Resident, Department of anesthesia, Shri Sathya Sai Medical College and Research Institute, Ammapettai, Chengalpattu District, Tamil Nadu, 603108 India.

Corresponding Author: Dr Anusha Balasubramanian, Professor, Department of anesthesia, Shri Sathya Sai Medical College and Research Institute, Ammapettai, Chengalpattu District, Tamil Nadu, 603108 India.

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KEYWORDS

Dexmedetomidine with Levobupivacaine, Dexmedetomidine with Ropivacaine

ABSTRACT:

Background: Effective postoperative pain control is essential for enhanced recovery following total abdominal hysterectomy. The Transverse Abdominis Plane (TAP) block, guided by ultrasound, offers targeted analgesia for lower abdominal surgeries. This study compares the postoperative analgesic efficacy of Dexmedetomidine combined with ropivacaine versus Dexmedetomidine combined with Levobupivacaine in TAP blocks.

Materials And Methods: In a randomized, double blinded study, female patients undergoing total abdominal hysterectomy were divided into two groups. Group LD received Dexmedetomidine with levobupivacaine, while group RD received Dexmedetomidine with Ropivacaine for ultrasound guided TAP blocks after surgery.

Results: Both combinations provided effective postoperative analgesia. However Group L showed significantly longer duration of analgesia and reduced need for rescue analgesics compared to group R ($p < 0.05$).

Conclusion: Dexmedetomidine with levobupivacaine provides superior postoperative analgesic efficacy compared to Dexmedetomidine with Ropivacaine in Ultrasound guided TAP blocks for total abdominal hysterectomy, with prolonged analgesia and reduced need for additional analgesics.

INTRODUCTION

Various factors, including incisional discomfort, pain from deeper (visceral) structures, and dynamic pain such as during coughing or mobilization

can cause pain after total abdominal hysterectomy (TAH). Postoperative pain, on the other hand, is often mostly caused by the abdominal wall incision¹. A multimodal strategy is absolutely necessary to properly



lower pain following TAH since uncontrolled pain could result in extended hospital stays². Traditionally included in multimodal pain management plans, opioids carry the danger of major adverse effects including drowsiness, nausea, vomiting, and respiratory depression, which could compromise early patient mobility¹.

Especially when done as part of a multimodal analgesic regimen³, the transversus abdominis plane (TAP) block seems to be an appropriate method for reducing postoperative pain in patients undergoing lower abdomen gynecological procedures in this setting. TAP is a gap between the TA and internal oblique (IO) muscles. A local anesthetic (LA) is given into the area that might be the "TAP plane," where the T6 to L1 nerve roots will be cut⁴.

Peripheral nerve blocks and field blocks have successfully employed adjuvants to local anesthetics such as opioids, ketamine, dexamethasone, and alpha-2 agonists (such as dexmedetomidine) to prolong the duration of postoperative analgesia⁵. Compared to bupivacaine, local anesthetic drug levobupivacaine has longer duration of action, more safety, and lower toxic profile⁶. Though the literature has been thoroughly examined, no research could be identified comparing dexmedetomidine and dexamethasone as levobupivacaine adjuncts in TAP blocks. Still, studies on the general effectiveness of these two compounds as adjuvants in LA⁷⁻⁹ yield mixed results. Thus, we carried out our research with TAP blocks using levobupivacaine as a local anesthetic and dexamethasone or dexmedetomidine as an adjuvant. While dexamethasone lowers pain by lowering inflammation and blocking pain-causing unmyelinated "C" fiber transmission, dexmedetomidine has sedative, analgesic, and perioperative sympatholytic effects¹⁰.

Our study was to assess the post-surgical analgesic efficacy of addition of dexmedetomidine with levobupivacaine against Dexmedetomidine with ropivacaine in transversus abdominis plane block in total abdominal hysterectomy procedures with the use of ultrasound.

AIM

To compare the post operative analgesic efficacy of addition of dexmedetomidine with levobupivacaine versus Dexmedetomidine with ropivacaine in transversus

abdominis plane block in total abdominal hysterectomy surgeries with the help of ultrasound.

OBJECTIVES

Primary objective

- The duration of Analgesia in post-operative period between the two groups.

Secondary objective

- To monitor heart rate, BP, SPO2 from the time of TAP block to the time of break through pain.
- To monitor for complications, if any, from the time of tap block to the time of breakthrough pain.

METHODOLOGY

STUDY DESIGN

Randomized control study

STUDY AREA

A Tertiary care hospital, Ammapettai , Chengalpattu district, South India.

STUDY POPULATION

Patients posted for total abdominal hysterectomy surgeries from Department of OBG, A tertiary care hospital, Amutk, mapettai, Chengalpattu district who satisfy the inclusion criteria.

DURATION

18 Months

SAMPLE SIZE

RCT Sample size calculation done by Open Epi Software based on previous study (1 and 2). The Mean and SD of rescue analgesia in RD and LD group is 474.3+/- 153.99 and 565+/-71.5 with 5% level of significance and 80% power. The total sample size is 31 in each group including 10% non-response rate.

INCLUSION CRITERIA

- ❖ Adult patients between age of 18 to 60 years of both sexes.
- ❖ Patience belonging to ASA class one and two posted for elective lower abdominal



hysterectomy surgeries belonging to ASA class one and two.

- ❖ Weight from 50 to 80 kgs.

EXCLUSION CRITERIA

- ❖ Patient refusal for regional anesthesia.
- ❖ Pregnancy and lactating female.
- ❖ Obese patients.
- ❖ Patience with ASA class three and four.
- ❖ Patient is allergic to local anesthetics and Dexmedetomidine.
- ❖ Patient is having local site infection.
- ❖ Patients having any bleeding Coagulopathy disorders.

STUDY VARIABLES

- ❖ Includes Postoperative pain score (VAS).
- ❖ Time of Rescue analgesia.
- ❖ Hemodynamic factors such as systolic and diastolic blood pressure.
- ❖ Heart rate.
- ❖ Mean arterial pressure.

ETHICAL CONSIDERATIONS

- ❖ Informed and written consent obtained from all patients in their

native language.

- ❖ Confidentiality of patient data ensured.
- ❖ Patients have the right to withdraw from the study

DATA COLLECTION

- ❖ After approval from ethical committee, patients posted for total abdominal hysterectomy surgeries from the Department of OBG, will be taken for study after obtaining written and informed consent anesthetic checkup will be done on those patients who fit into the inclusion criteria will be analyzed thoroughly and taken up for the study.

- ❖ Patient was randomly allocated into two equal groups to get their TAP BLOCK with 0.25% Levobupivacaine with Dexmedetomidine (Control group) and 0.25% Ropivacaine with Dexmedetomidine (Test group).
- ❖ Standard monitoring Included ECG, pulse oximetry and non-invasive blood pressure.
- ❖ An 18-gauge intravenous access will be established for all patients included in the study.
- ❖ At the end of surgery, ultrasound guided TAP block will be administered by posterior approach and during the injection, the distribution of local anesthetic will be observed as a hypoechoic enlargement on ultrasonography.
- ❖ Further patients will be assessed for the efficacy of post operative analgesia using the VAS score and will be monitored for other variables such as hemodynamic factors, TFA etc.

ANALYTICAL METHODS

Data will be entered in MS - Excel and statistical analysis, which will be done by SPSS 16 software, the results will be presented in descriptive statistics. Univariate and multivariate binary logistic regression analysis will be done to assess the independent factors associated with delay in diagnosis. P value < 0.05 is considered as statistically significant.

BUDGET

62 PATIENTS (2 GROUPS)

31 VIALS OF LEVOBUPIVACAINE 0.50% - Rs 18,765/-

31 VIALS OF ROPIVACAINE 0.50% - Rs 6866.50/-

62 AMPOULES OF DEXMEDETOMIDINE 50mcg - Rs 12,400/-

62 THREE WAY CATHETERS - Rs 1240/-

62 QUINCKE'S 23 G SPINAL NEEDLE - Rs 5580/-
2 mL, 10 mL Syringes - Rs 992/-

TOTAL BUDGET - ~Rs 45,844/-



RESULTS

Table 7.1 Comparison of mean age between the group RD and group LD of the patients

AGE	GROUP RD	GROUP LD
MEAN	46.39	49.55
SD	6.56	5.51
P VALUE	0.061	

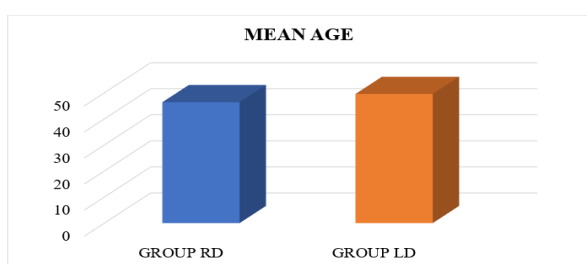


Figure 7.1 Comparison of mean age between the group RD and group LD of the patients

Mean age in Group RD was 46.39±6.56 years and mean age in Group LD was 49.55±5.51 years. P value was 0.061 >0.05 statistically not significant.

Mean weight in Group RD was 52.68±10.17 kg and mean weight in Group LD was 54.39±6.97kg. P value was 0.39>0.05 statistically not significant.

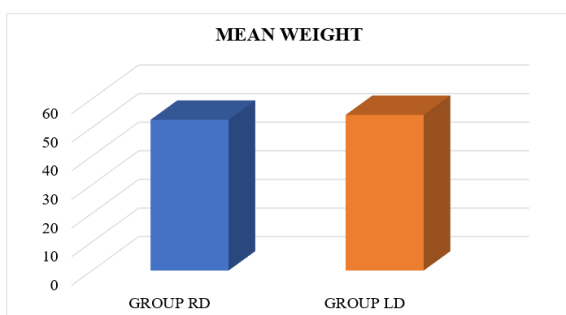


Figure 7.2 Comparison of mean weight between the group RD and group LD of the patients

Table 7.2 Comparison of mean weight between the group RD and group LD of the patients

WEIGHT	GROUP RD	GROUP LD
MEAN	52.68	54.39

SD	10.17	6.97
P VALUE	0.39	

Table 7.3 Comparison of ASA grading between the group RD and group LD of the patients

ASA GRADING	GROUP RD	GROUP LD
ASA I	18	17
ASA II	13	14
P VALUE	0.795	

In Group RD, 18 patients in ASA are grading I and 13 patients in ASA grading II. In Group LD, 17 patients in ASA grading I and 14 patients in ASA grading II. P value was 0.795>0.05 statistically not significant.

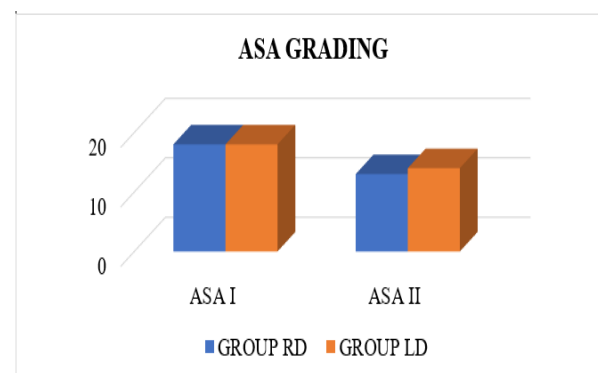


Figure 7.3 Comparison of ASA grading between the group RD and group LD of the patients

Table 7.4 Comparison of mean duration of surgery between the group RD and group LD of the patients

DURATION OF SURGERY	GROUP RD	GROUP LD
MEAN	64.74	65.06
SD	7.23	7.43
P VALUE	0.884	

Mean duration of surgery in Group RD was 64.74±7.23 mins and mean duration of surgery in Group LD was 65.06±7.43mins. P value was 0.884>0.05 statistically not significant.

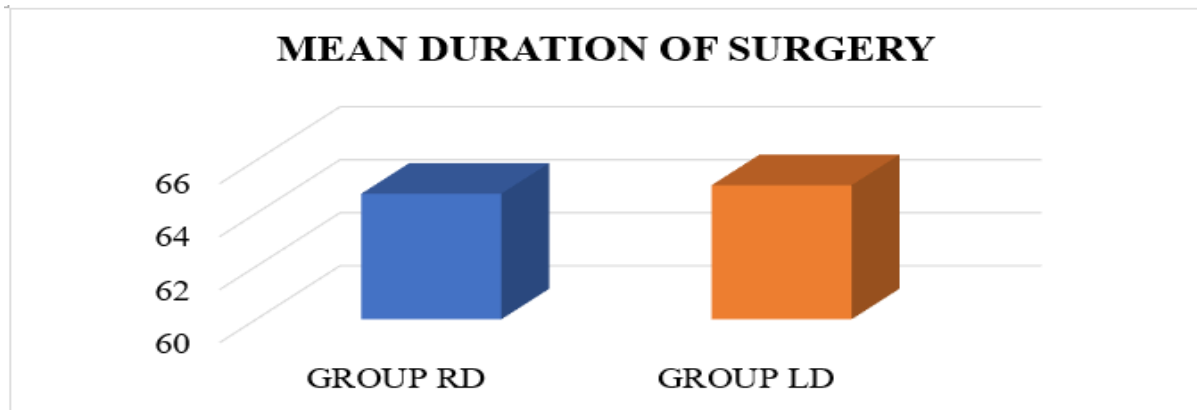


Figure 7.4 Comparison of mean duration of surgery between the group RD and group LD of the patients

Table 7.5 Comparison of mean heart rate between the group RD and group LD of the patients

HEARTRATE	GROUP RD		GROUP LD		P VALUE
	MEAN	SD	MEAN	SD	
PRE-OPERATIVE	78.35	6.95	79.65	5.56	0.399
AFTER BLOCK					
0 MINS	86.68	12.18	79.19	5.92	0.011
2 HOURS	83.77	9.73	79.19	5.9	0.046
4 HOURS	84.1	5.87	78.61	5.87	0.006
6 HOURS	84.58	8.86	79.94	4.68	0.013
8 HOURS	82.58	13.03	78.97	5.46	0.172
12 HOURS	82.23	7.84	84.1	12.38	0.478
18 HOURS	83.03	9.39	87.58	10.16	0.095
24 HOURS	79.58	5.1	83.16	10.75	0.111

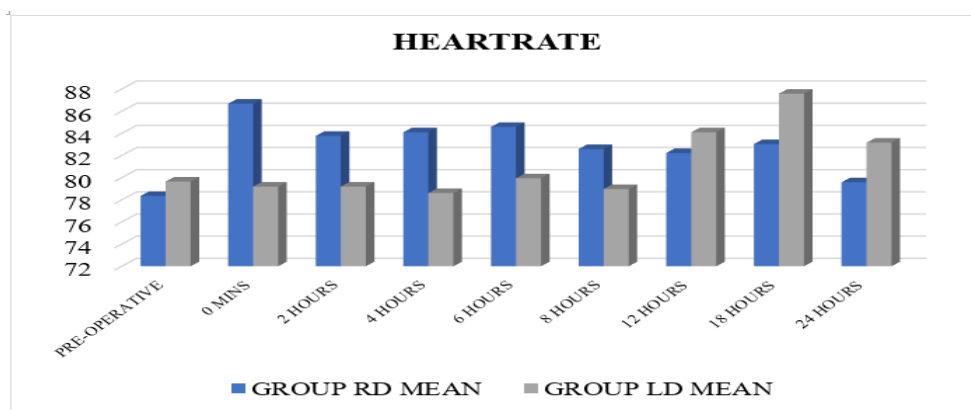


Figure 7.5 Comparison of mean heart rate between the group RD and group LD of the patients



Table 7.6 Comparison of mean arterial pressure between the group RD and group LD of the patients

MEAN ARTERIAL PRESSURE	GROUP RD		GROUP LD		P VALUE
	MEAN	SD	MEAN	SD	
PRE-OPERATIVE	82.45	11.96	83.97	7.22	0.598
AFTER BLOCK					
0 MINS	91.81	3.8	83.74	7.77	0.001
2 HOURS	89.45	8.57	85.39	3.64	0.02
4 HOURS	90.74	3.74	91.55	4.42	0.479
6 HOURS	90.81	3.53	86.97	11.08	0.103
8 HOURS	91.23	4.12	83.42	11.21	0.001
12 HOURS	84.74	8.14	81.71	11.21	0.209
18 HOURS	88.84	3.62	84.48	11.69	0.884
24 HOURS	87.29	6.82	86.61	7.41	0.736

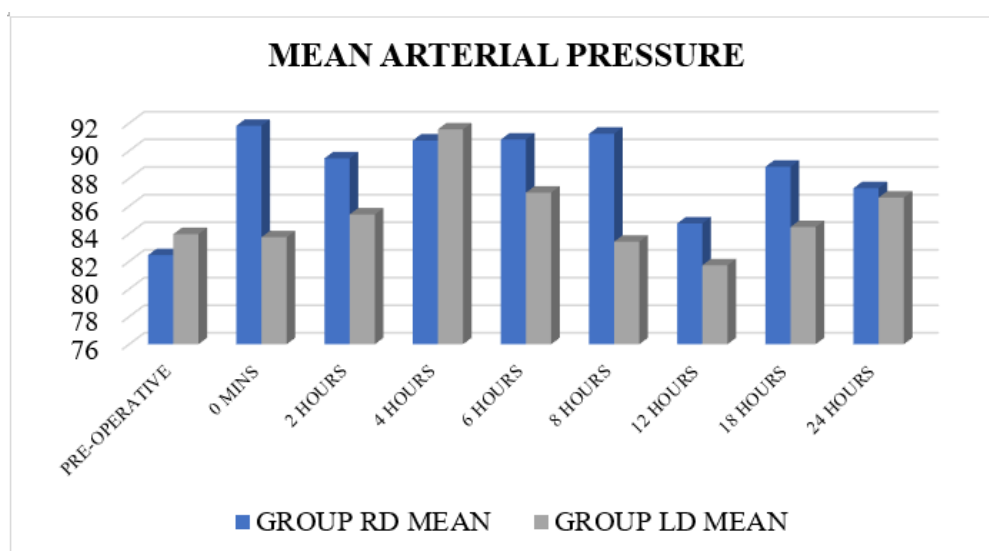


Figure 7.6 Comparison of mean arterial pressure between the group RD and group LD of the patients

Table 7.7 Comparison of mean SPO2 between the group RD and group LD of the patients

SPO2	GROUP RD		GROUP LD		P VALUE
	MEAN	SD	MEAN	SD	
PRE-OPERATIVE	99.06	0.85	98.74	0.51	0.546
AFTER BLOCK					
0 MINS	99.1	0.83	98.74	0.51	0.609



2 HOURS	98.94	0.68	98.74	0.58	0.206
4 HOURS	98.74	0.63	98.65	0.55	0.551
6 HOURS	98.77	0.62	99.13	0.76	0.236
8 HOURS	98.84	0.64	99.42	0.72	0.376
12 HOURS	98.81	0.6	99.39	0.67	0.886
18 HOURS	98.81	0.6	99.03	0.84	0.269
24 HOURS	98.84	0.69	99	0.77	0.432

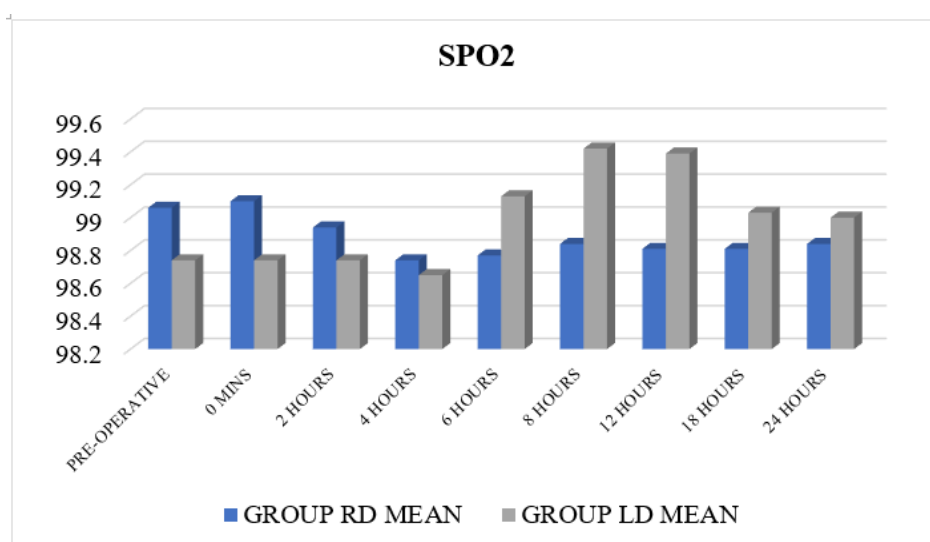


Figure 7.7 Comparison of mean SPO2 between the group RD and group

LD of the patients

Table 7.8 Comparison of mean VAS between the group RD and group LD of the patients

VAS	GROUP RD		GROUP LD		P VALUE
	MEAN	SD	MEAN	SD	
0 MINS	0.19	0.54	0.16	0.52	0.745
2 HOURS	0.23	0.8	0.29	0.86	0.601
4 HOURS	0.29	0.82	0.26	0.68	0.813
6 HOURS	0.42	1.09	0.45	1.06	0.801
8 HOURS	1.55	0.99	1	0.58	0.002
12 HOURS	2.61	0.5	1.71	0.74	0.001
18 HOURS	2.94	1.24	2.48	0.63	0.075
24 HOURS	3.61	0.8	2.48	0.57	0.001

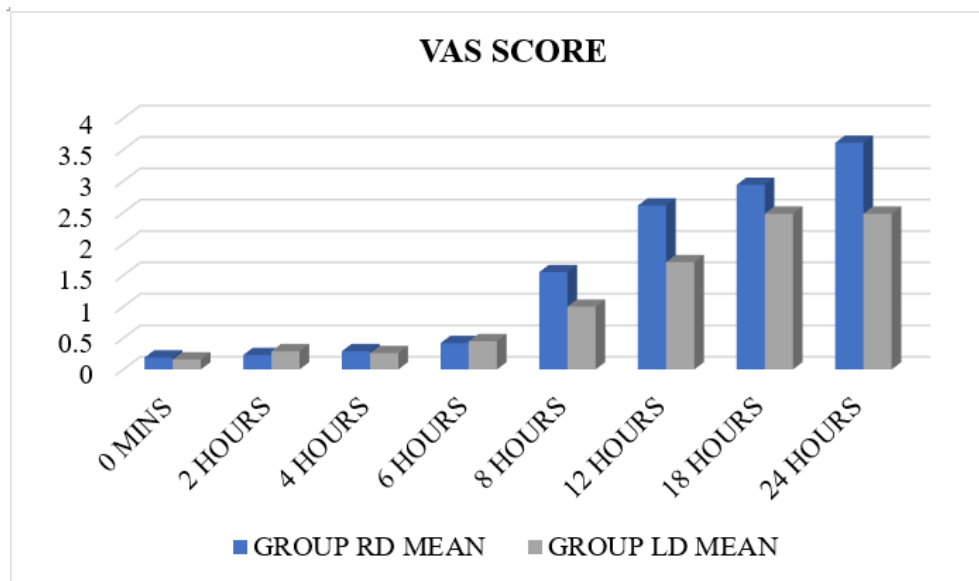


Figure 7.8 Comparison of mean VAS between the group RD and group LD of the patients

Table 7.9 Comparison of mean duration of analgesia between the group RD and group LD of the patients

DURATION OF ANALGESIA	GROUP RD	GROUP LD
MEAN	7.42	9.75
SD	1.04	0.87
P VALUE	0.001	

Mean duration of analgesia in Group RD was 7.42±1.04hours and mean duration of analgesia in Group LD was 9.75±0.87hours. P value was 0.001 <0.05 statistically significant.

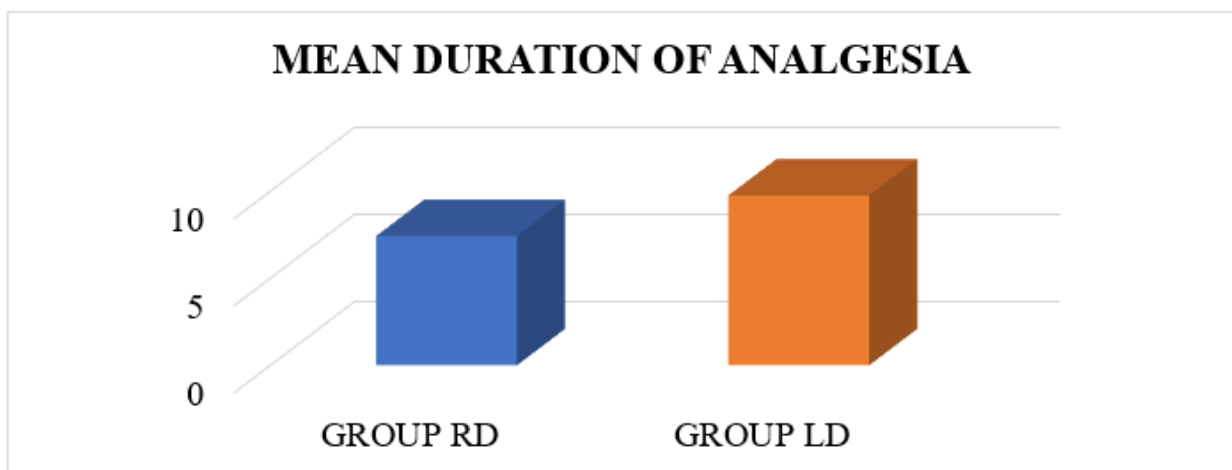


Figure 7.9 Comparison of mean duration of analgesia between the group RD and group LD of the patients



Table 7.10 Comparison of mean time for 1st dose of rescue analgesia between the group RD and group LD of the patients

TIME FOR 1st DOSE OF RESCUE ANALGESIA	GROUP RD	GROUP LD
MEAN	7.42	9.75
SD	1.04	0.87
P VALUE	0.001	

Mean time for 1st dose of rescue analgesia in Group RD was 7.42±1.04 hours and mean time for 1st dose of rescue analgesia in Group LD was 9.75±0.87 hours. P value was 0.001 <0.05 statistically significant.

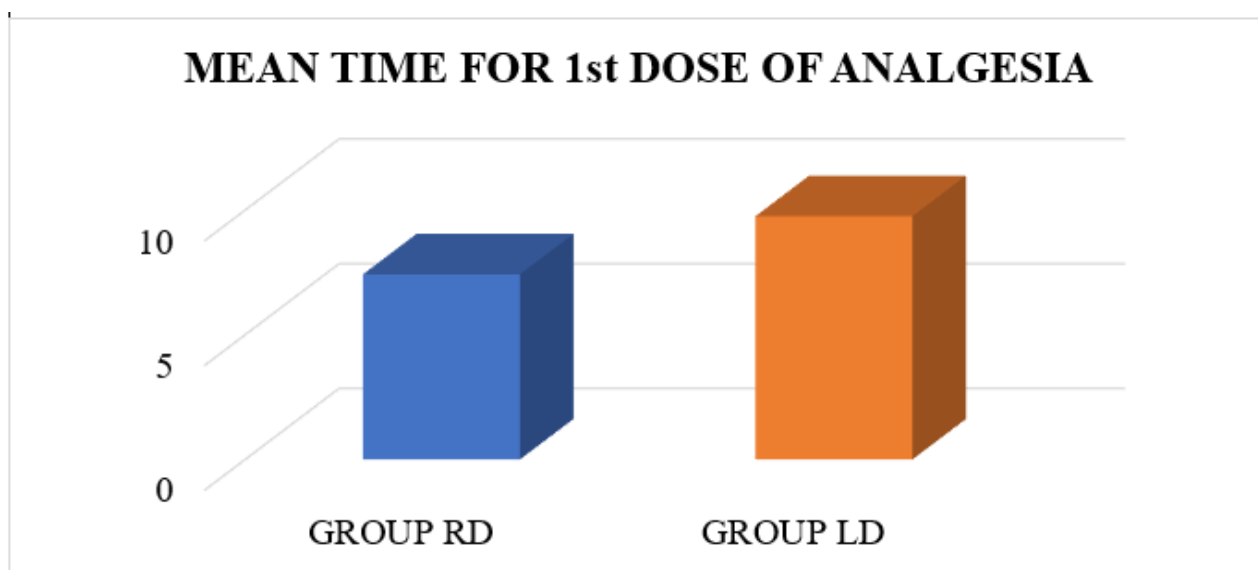


Figure 7.10 Comparison of mean time for 1st dose of rescue analgesia between the group RD and group LD of the patients

Table 7.11 Comparison of mean total dose of rescue analgesia between the group RD and group LD of the patients

TOTAL DOSE OF RESCUE ANALGESIA	GROUP RD	GROUP LD
MEAN	2.16	1.71
SD	0.69	0.46
P VALUE	0.008	

Mean total dose of rescue analgesia in Group RD was 2.16±0.69 and mean total dose of rescue analgesia in Group LD was 1.71±0.46. P value was 0.001 <0.05 statistically significant.

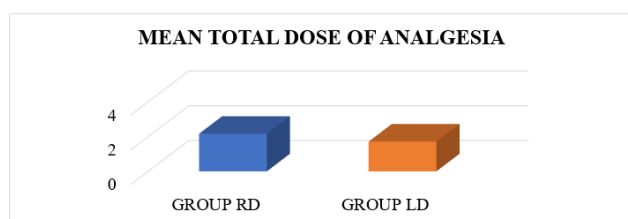


Figure 7.11 Comparison of mean total dose of rescue analgesia between the group RD and group LD of the patients

Table 7.12 Comparison of complications between the group RD and group LD of the patients

COMPLICATIONS	GROUP RD	GROUP LD
PONV	2	2
HYPOTENSION	2	1
BRADYCARDIA	1	2
P VALUE	0.854	

In ropivacaine group, 2 patients having nausea and vomiting, 2 patients having hypotension and 1 patients having bradycardia. In levobupivacaine group, 2 patients having nausea and vomiting, 1 patients having hypotension and 2 patients having bradycardia.

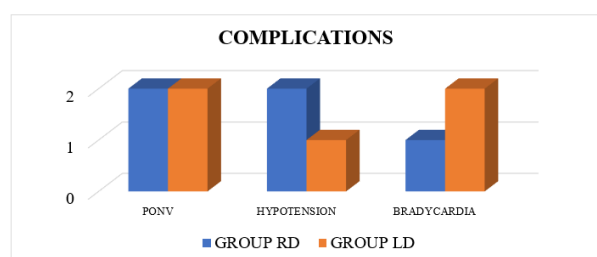


Figure 7.12: Comparison of complications between the group RD and group LD of the patients

DISCUSSION

Post-operative pain management plays a crucial role in enhancing recovery outcomes, facilitating early mobilization, and minimizing morbidity in patients who have undergone total abdominal hysterectomy. The ultrasound-guided Transversus Abdominis Plane (TAP) block is gaining popularity as a component of multimodal analgesia for abdominal surgeries, owing to its effectiveness in blocking the sensory nerves of the anterior abdominal wall. The selection of local anesthetic

and adjuvant is essential in influencing the effectiveness and longevity of the block.

This investigation aimed to evaluate the analgesic effectiveness of Dexmedetomidine when used as an adjunct to Levobupivacaine in comparison to its use with Ropivacaine in TAP blocks for patients undergoing total abdominal hysterectomy.

Demographic data:

Mean age in Group RD was 46.39 ± 6.56 years and mean age in Group LD was 49.55 ± 5.51 years. Mean weight in Group RD was 52.68 ± 10.17 kg and mean weight in Group LD was 54.39 ± 6.97 kg. In Group RD, 18 patients in ASA grading I and 13 patients in ASA grading II. In Group LD, 17 patients in ASA grading I and 14 patients in ASA grading II.

The demographic parameters, including age, weight, and ASA grade, were comparable across both groups, thereby removing confounding variables and confirming that the differences observed were attributable to the drugs administered rather than to patient-related factors.

Duration of analgesia:

Mean duration of analgesia in Group RD was 7.42 ± 1.04 hours and mean duration of analgesia in Group LD was 9.75 ± 0.87 hours. Mean time for 1st dose of rescue analgesia in Group RD was 7.42 ± 1.04 hours and mean time for 1st dose of rescue analgesia in Group LD was 9.75 ± 0.87 hours.

The duration of postoperative analgesia, indicated by the time until the first rescue analgesia was required, was notably extended in the Levobupivacaine + Dexmedetomidine group (Group LD) when compared with the Ropivacaine + Dexmedetomidine group (Group RD). This finding aligns with earlier research (e.g., Singh *et al.*, 2020; Naglaa *et al.*, 2019) indicating that Levobupivacaine, as a more potent enantiomer of bupivacaine, offers a marginally extended duration of action compared to Ropivacaine.

Dexmedetomidine works in conjunction with local anesthetics by inhibiting nerve conduction through α_2 -adrenoceptor agonism and hyperpolarizing nerve membranes, which improves both the duration and quality of the block. The extended effect observed in Group LD could be attributed to the marginally greater



lipid solubility of Levobupivacaine when compared with Ropivacaine.

VAS score:

Pain scores assessed at various intervals (0h, 2h, 4h, 6h, 8h, 12h, 18h, and 24h) were consistently lower in Group LD than in Group RD. The analgesic profile indicates that Group L achieved superior pain management, especially during the initial 12 hours following the operation. The results are consistent with the work of El Sherif *et al.* (2021) and Rao *et al.* (2018), who observed enhanced analgesic effects when using combinations of Levobupivacaine and dexmedetomidine.

Rescue analgesia requirement:

Mean total dose of rescue analgesia in Group RD was 2.16 ± 0.69 and mean total dose of rescue analgesia in Group LD was 1.71 ± 0.46 . Patients in Group LD demonstrated a reduced need for rescue analgesics over a 24-hour period compared to those in Group RD. This reduction holds important implications for enhancing patient comfort and minimizing opioid-related side effects such as nausea and sedation.

Complications

In ropivacaine group, 2 patients having nausea and vomiting, 2 patients having hypotension and 1 patients having bradycardia. In levobupivacaine group, 2 patients having nausea and vomiting, 1 patients having hypotension and 2 patients having bradycardia.

No significant adverse events were noted in either group. Minor side effects including nausea, bradycardia, and hypotension were found to be comparable and self-limiting, thereby reinforcing the safety profile of both drug combinations.

A meta-analysis by Abdallah *et al.* (2019) indicates that Levobupivacaine exhibits superior efficacy in regional blocks compared to Ropivacaine when administered with alpha-2 agonists. Research conducted by Toleska *et al.* (2020) and Bharti *et al.* (2017) reveals that although both Levobupivacaine and Ropivacaine provide effective analgesia, Levobupivacaine provides a slightly prolonged duration, probably attributable to its pharmacodynamic and pharmacokinetic characteristics. In contrast, Ropivacaine is regarded as less cardiotoxic

and may be favored in high-risk patients, regardless of its slightly reduced analgesic duration.

CONCLUSION

The addition of dexmedetomidine with levobupivacaine and ropivacaine in ultrasound-guided transversus abdominis plane (TAP) blocks resulted in effective post-operative analgesia for patients undergoing total abdominal hysterectomy. However, the combination of dexmedetomidine and levobupivacaine exhibited enhanced analgesic efficacy, characterized by an extended duration of analgesia, a decreased need for rescue analgesics, and improved pain scores in comparison to the dexmedetomidine-ropivacaine group.

Both combinations were well-tolerated with no significant adverse effects; however, levobupivacaine may provide a more potent and longer-lasting analgesic effect in this clinical context. It is recommended to conduct additional studies involving larger sample sizes and different surgical populations to confirm these findings.

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