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Original Article

Comparison of Postoperative Analgesia with Transversus Abdominis Plane(TAP) Block versus Local Infiltration with Ropivacaine and Dexmedetomidine in Elective Caesarean Section under Spinal Anaesthesia

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ABSTRACT

Background: Effective pain control in the postoperative period in elective lower segment cesarean sections is essential for enhancing maternal recovery, breastfeeding, and bonding. Our study compares Transversus Abdominis plane (TAP) block with local anesthesia infiltration for the same, and provides valuable insights into which method offers better pain relief, reduced opioid consumption, and improved hemodynamic stability.

Methodology: This observational study was conducted in the Department of Anaesthesiology in a superspeciality medical college hospital involving 70 patients undergoing elective caesarean sections under spinal anaesthesia. Patients were divided into two groups : one received local infiltration with 0.2% Ropivacaine 20ml and 50mcg Dexmedetomidine (Group I), while the other received a TAP block (Group II) with 0.2% Ropivacaine 20ml and 50mcg Dexmedetomidine. Postoperative pain was assessed using the Visual Analogue Scale (VAS) at various intervals, and the requirement for rescue analgesia with Fentanyl, hemodynamic parameters and adverse effects were documented. Observational descriptive stastistics, parametric and non-parametric tests were used as applicable.

Results: Significant differences were observed in pain management outcomes, with Group I reporting higher Visual Analog Scale (VAS) pain scores at 4, 6, and 8 hours post-procedure, while Group II exhibited higher scores at 12 hours ($p < 0.05$). Group I had higher heart rate upto 8hours postoperatively ($p = 0.002$).Group I had higher Systolic Blood Pressure (SBP) at 2,4,8 hours postoperatively (p value is 0.012).Group I had higher Diastolic Blood Pressure (DBP) at 2hours while Group II had higher DBP only after 10minutes.Group I had more adverse effects compared to Group II .Additionally, Group I showed higher incidence of the need for Fentanyl rescue opioids at 6 and 8 hours postoperatively ($p < 0.05$) and needed their first dose of rescue opioids considerably earlier than Group II ($p < 0.001$). Furthermore, the cumulative dose of Fentanyl administered was significantly greater in Group I compared to Group II.

Conclusion: The TAP block group demonstrated lower pain scores, reduced opioid consumption, better hemodynamic stability, and fewer adverse effects, making it a

more effective and safer option for postoperative analgesia , compared to the local anesthesia infiltration group.

Keywords*: Postoperative pain management, TAP block, Local infiltration, Visual Analog Scale (VAS), Opioid consumption.*

BACKGROUND

In patients undergoing caesarean section, poor pain management can impair mobility, breastfeeding, and mother-child bonding, whereas good analgesia increases the quality of nursing, the weight gain of the baby, and the overall well-being of the mother [1,2]. Opioids are the preferred treatment for postoperative pain, but can have unfavourable side effects following caesarean sections, including nausea, vomiting, drowsiness, retention of urine, respiratory depression, and prolonged postoperative ileus[3, 4, 5]. These side effects emphasize the necessity of investigating alternate analgesic techniques.

In multimodal analgesia regimes, local anaesthetic infiltration at the surgical site is a typical method. Studies have shown that using local anaesthetics to infiltrate wounds during caesarean sections can lower the amount of opioids used. Nevertheless, several investigations on the efficacy of this technique for postoperative pain reduction have produced inconsistent findings; majority of them found no appreciable improvement in pain scores. [6, 7, 8, 9]

Postoperative analgesia has been successfully achieved with long-acting local anaesthetics applied at the site of the wound or on top of or beneath the skin following surgery.[10, 11] Research has indicated that, apart from general or regional anaesthesia, abdominal wall blocks and local anaesthetic infiltration are beneficial for managing postoperative pain after caesarean birth.[12]

The Transversus Abdominis Plane (TAP) block has been more well-liked as a pain relief method within the last ten years. Targeting the thoraco-lumbar nerves (T6-L1) that innervate the anterior abdominal wall, the TAP block was first reported by Rafi in 2001. It entails injecting a local anaesthetic into the fascial plane between the internal oblique and transversus abdominis muscles. It has been demonstrated that this technique, which is guided by ultrasound or anatomical landmarks, is a safe and efficient way to manage pain after lower abdominal procedures. It also lowers the amount of opioids used and improves patient satisfaction. [13].

Targeting the anterior abdominal wall's nerves, the TAP block is useful when used in conjunction with other multimodal analgesics for procedures like open appendectomy, laparoscopic cholecystectomy, hysterectomy, caesarean section, and large intestine resection via midline abdominal incision. [14, 15]

Considering these results, we performed a study comparing the length and quality of analgesia in patients undergoing elective lower segment caesarean sections under spinal anaesthesia, in order to assess the analgesic efficacy of local anaesthesia infiltration vs the TAP block given at the end of surgery.

We also compared the two groups' use of opioid rescue analgesics during the postoperative period in terms of demand, cumulative dosage, and side effects.and how the local infiltration and TAP block affect haemodynamic parameters.
The findings suggest that the TAP block is a more effective and safer option, potentially influencing clinical practices and improving postoperative outcomes for cesarean section patients.

METHODOLOGY

Study Design and Setting: A prospective observational study was conducted in the Department of Anaesthesiology, in a superspeciality medical college hospital from October 2022 to October 2023, after obtaining Institutional Research committee (IRC No:) and Ethics Committee approval (IEC No: 47/619/09/2022).

Participants: Seventy patients undergoing elective lower segment caesarean section under spinal anaesthesia were included by consecutive sampling. The exclusion criteria were patient's refusal, allergy to opioids, amide group of local anaesthetic and non-steroidal anti-Inflammatory drugs, coagulation derangement or bleeding disorders, infection at the site of block, patients more than ASA II grade, patients with cardiovascular, pulmonary or neurological diseases , patients converted to general anaesthesia after giving subarachnoid block.

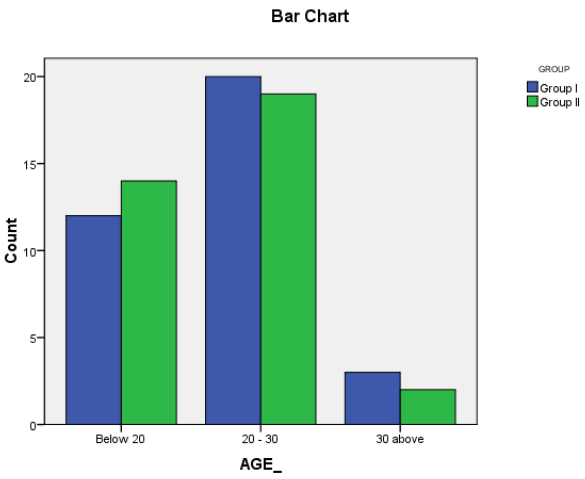
Study Procedure : After obtaining clearance from Institutional Ethics Committee , 70 patients scheduled for LSCS under spinal anaesthesia were randomly divided into two groups of 35 each based on inclusion and exclusion criteria. A pre-anaesthetic evaluation was done. Informed written consent for anaesthesia was taken. Patients were kept NPO for atleast 8 hours premedication with oral Ranitidine150mg and Metoclopramide 10mg were given on the night preceding the surgery and again on the morning of the surgery. On receiving patient in the pre-operative room NPO status and informed consent were cross checked. After shifting the patient to operation theatre minimum mandatory monitors such

as pulse oximetry, non-invasive blood pressure and electrocardiogram were attached. Baseline pulse rate, blood pressure and oxygen saturation were recorded. Before the procedure an intravenous line was established and all patients were preloaded with 10 to 15 ml per kg of 0.9% saline . Patients were put in right lateral position and under strict aseptic precaution and local anaesthesia lumbar subarachnoid block was given using 23G Quincke spinal needle with injection Bupivacaine 0.5%(heavy) 1.8 +/-0.2 cc and injection Fentanyl 20mcg . Patient was positioned supine and level of block was assessed, surgery started. At the end of surgery ,
Group I patients received local infiltration at surgical incision with 20ml of 0.2% Ropivacaine + 50mcg Dexmedetomidine .

Group II patients received Transversus Abdominus Plane(TAP) block with 10ml of 0.2% Ropivacaine + 25mcg - Dexmedetomidine on each side at the end of surgery . TAP block was performed under strict asepsis under USG guidance with a linear (7-11MHz) ultrasound transducer using in-plane technique . The probe was placed subcostally between the costal margin and the iliac crest in the lateral abdominal wall, and the external oblique, internal oblique, and transversus abdominis muscles were identified , the prepared local anesthetic solution (Ropivacaine + Dexmedetomidine) was given after careful aspiration to exclude vascular puncture using a 20G (50mm) needle. Using an identical technique, TAP block was then performed on the opposite side. After completion of the procedure , patients were transferred to the postoperative ICU. The pain severity was assessed by using visual analogue score (VAS). Rescue analgesia (injection Fentanyl 1mcg/kg body weight) had been given to patients on demand or when VAS is more than 4 .

In the post-operative period VAS score was assessed at intervals of 2,4,6,8,10,12,16,24 hours .
The incidence of Fentanyl rescue requirement was documented.
Time to requirement of first dose of rescue opioid was recorded.
Cumulative dose of opioid was calculated.
Heart rate, systolic and diastolic blood pressure were recorded at the same intervals.
Patients were closely watched for adverse effects (nausea, vomiting) of opioids.
Statistical analysis : Quantitative Variables were expressed as mean and standard deviation (SD). Qualitative variable were expressed as frequency and percentage. Comparison of continuous variable between two group were analysed by student t test. Comparison of qualitative variable between two group were analysed by Chi- square test. A p-value <0.05 will be considered statistically significant. Data analysis was performed using SPSS version 22.0.

RESULTS



Graph 1: Age distribution

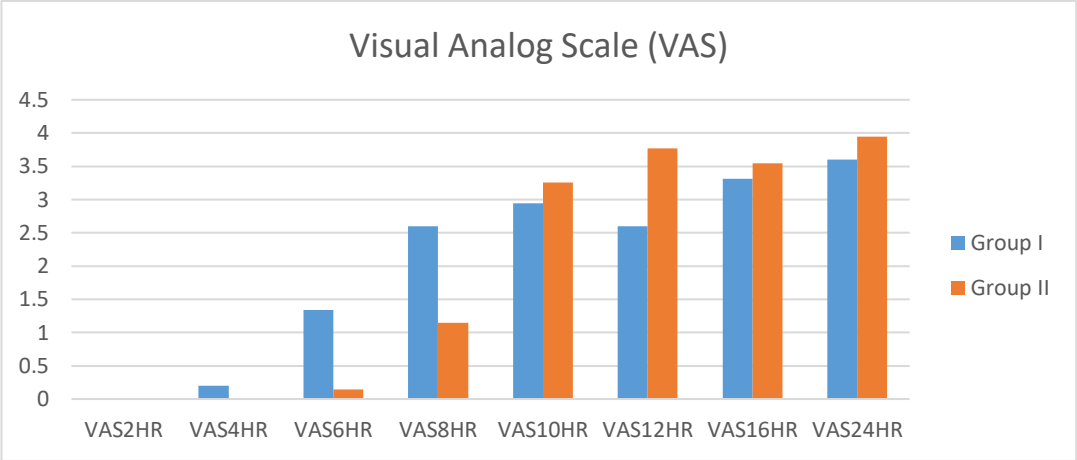
Table 1:- Comparison of Age Distribution between Group I and Group II

AGE	GROUP		Total	Chi - Square	P - Values
	Group I	Group II			
Below 20	12	14	26	3.807[a]	.051
20 – 30	20	19	39		
30 above	3	2	5		
Total	35	35	70		

The age distribution of participants between Group I and Group II was analyzed.

A chi-square test was conducted to determine if there was a significant association between the groups and the age distribution. The chi-square value was calculated to be 3.807 with a corresponding p-value of 0.051. This p-value indicates a trend towards statistical significance but is slightly above the conventional threshold of 0.05, suggesting that the difference in age distribution between Group I and Group II may not be statistically significant at the 5% level.

While the results show slight variations in the number of individuals in each age category between the two groups, the near-threshold p-value suggests that further investigation or a larger sample size might be necessary to confirm any potential association between group assignment and age distribution.

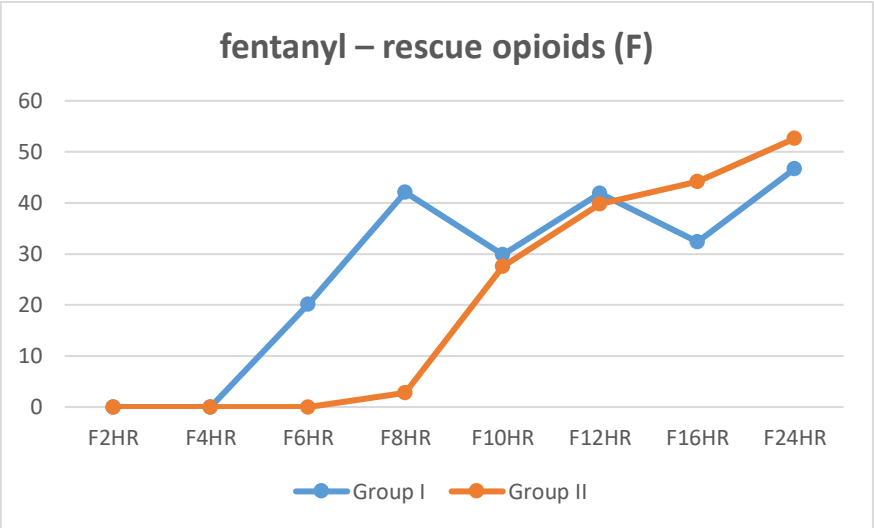


Graph 2 :- Comparison of Visual Analog Scale (VAS) Pain Scores at Various Time Intervals between Group I and Group II

Table 2:- Comparison of Visual Analog Scale (VAS) Pain Scores at Various Time Intervals between Group I and Group II

	GROUP	N	Mean	S.D	P- Values
VAS2hr	**Group I**	35	.0000	.00000[a]	
	Group II	35	.0000	.00000[a]	
VAS4hr	**Group I**	35	.2000	.47279	.015
	Group II	35	.0000	.00000	
VAS6hr	**Group I**	35	1.3429	1.23533	. 000
	Group II	35	.1429	.35504	
VAS8hr	**Group I**	35	2.6000	1.28795	. 000
	Group II	35	1.1429	1.11521	
VAS10hr	**Group I**	35	2.9429	1.18676	.259
	Group II	35	3.2571	1.12047	
VAS12hr	**Group I**	35	2.6000	1.49902	. 001
	Group II	35	3.7714	1.03144	
VAS16hr	**Group I**	35	3.3143	1.32335	.419
	Group II	35	3.5429	1.01003	
VAS24hr	**Group I**	35	3.6000	1.26491	.197
	Group II	35	3.9429	.90563	

The table presents the Visual Analog Scale (VAS) pain scores at various time intervals postoperatively between two groups, Group I and Group II. The scores are measured at 2, 4, 6, 8, 10, 12, 16, and 24 hours postoperatively.
Group II reported lower pain scores upto 8hours postoperatively.



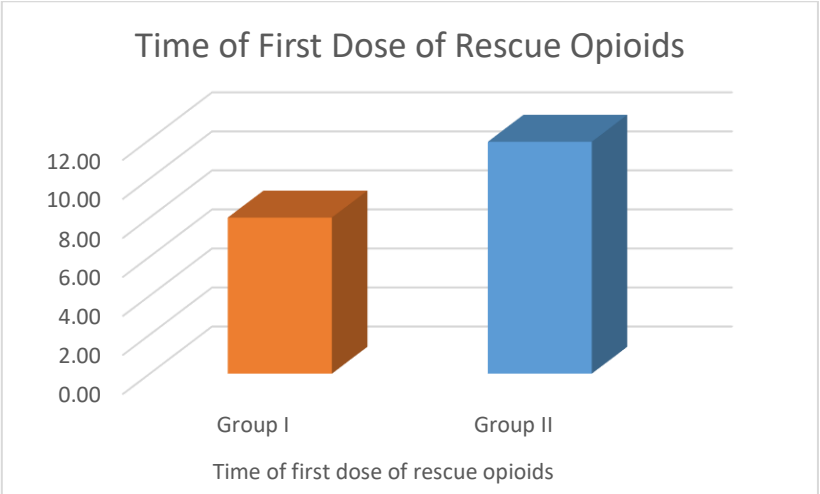
Graph 3:- Comparison of Fentanyl – rescue opioids (F) at Various Time Intervals between Group I and Group II

Table 3:- Comparison of Fentanyl – rescue opioids (F) at Various Time Intervals between Group I and Group II

	GROUP	N	Mean	S.D	Std. Error Mean
F2hr	**Group I**	35	.0000	.00000[a]	
	Group II	35	.0000	.00000[a]	
F4hr	**Group I**	35	.0000	.00000[a]	
	Group II	35	.0000	.00000[a]	
F6hr	**Group I**	35	20.1429	35.28634	.001
	Group II	35	.0000	.00000	
F8hr	**Group I**	35	42.0571	37.94109	.000
	Group II	35	2.7714	16.39599	
F10hr	**Group I**	35	29.8857	40.01454	.805
	Group II	35	27.5429	38.96102	
F12hr	**Group I**	35	41.8571	37.78277	. .830
	Group II	35	39.8000	41.87713	
F16hr	**Group I**	35	32.4000	38.59915	.227
	Group II	35	44.1143	41.70962	
F24hr	**Group I**	35	46.7143	39.62885	.531
	Group II	35	52.6286	39.00459	

The table presents the comparison of Fentanyl – rescue opioids (F) incidence at various time intervals postoperatively between two groups, Group I and Group II, each consisting of 35 individuals. The measurements are taken at 2, 4, 6, 8, 10, 12, 16, and 24 hours postoperatively.

Group I showed a higher incidence of Fentanyl-rescue opioids at 6 and 8 hours postoperatively.

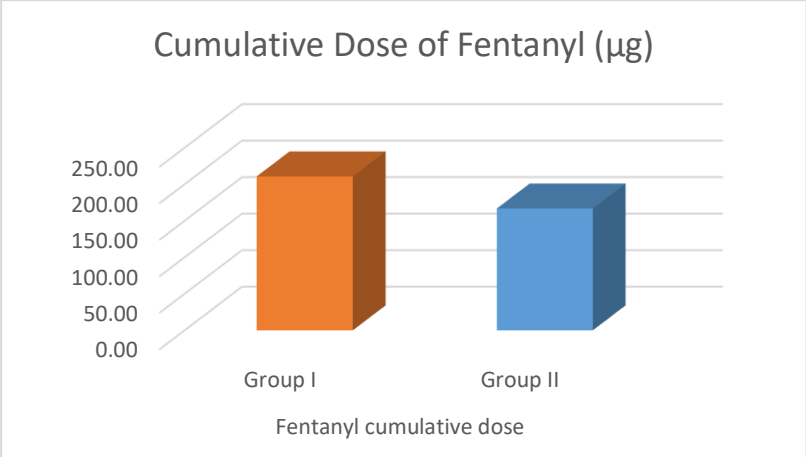


Graph 4 :- Group Comparison on Time of First Dose of Rescue Opioids

Table 4:- Group Comparison on Time of First Dose of Rescue Opioids

	GROUP	N	Mean	S.D	P- Values
Time of first dose of rescue opioids	**Group I**	35	8.0000	1.60880	<0.001
	Group II	35	11.8857	2.16620	

This table compares the time to the first dose of rescue opioids between two groups of patients undergoing elective lower segment caesarean section under spinal anesthesia. Group I had a mean time of 8.0000 hours with a SD of 1.60880, while Group II had a mean time of 11.8857 hours with an S.D. of 2.16620. The P-value for this comparison is <0.001, indicating a statistically significant difference between the two groups. In summary time for first rescue opioid was longer for Group II.



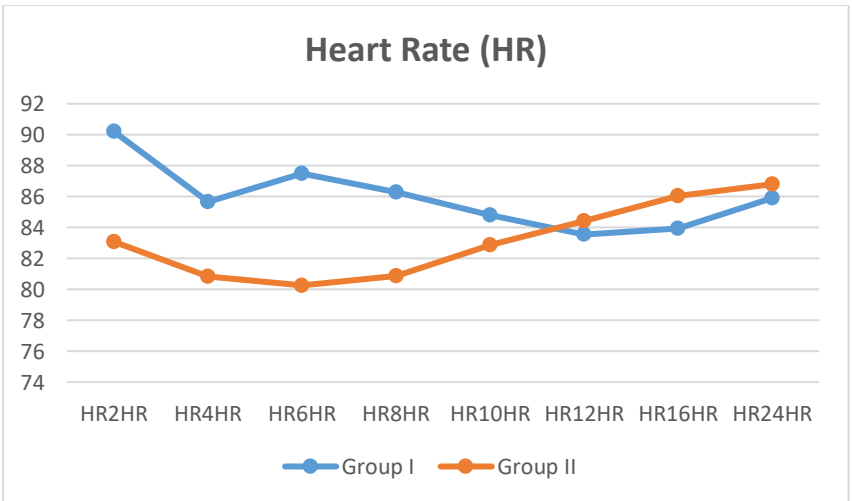
Graph 5: Group Comparison on Cumulative Dose of Fentanyl (µg)

Table 5: Group Comparison on Cumulative Dose of Fentanyl (µg)

	GROUP	N	Mean	S.D	P- Values
Fentanyl cumulative dose	**Group I**	35	2.1077E2	50.48476	<0.001
	Group II	35	1.6686E2	41.44957	

This table compares the cumulative dose of Fentanyl between two groups of patients undergoing elective lower segment caesarean section under spinal anesthesia. Group I had a mean dose of 210.77 micrograms with an S.D. of 50.48476, whereas Group II had a mean dose of 166.86 micrograms with an S.D. of 41.44957. The P-value for this comparison is <0.001, indicating a statistically significant difference between the two groups.

In summary Group I required a higher cumulative dose of Fentanyl compared to Group II.
Overall, the results suggest that the TAP block (Group II) was more effective in delaying the need for rescue opioids and reducing the cumulative dose of Fentanyl compared to local infiltration (Group I).

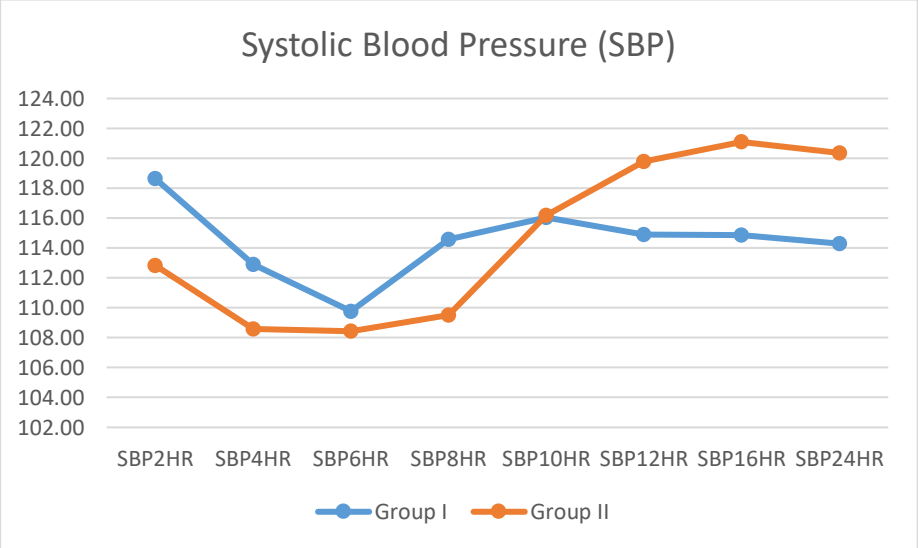


Graph 6:- Comparison of Heart Rate (HR) at Various Time Intervals between Group I and Group II

Table 6:- Comparison of Heart Rate (HR) at Various Time Intervals between Group I and Group II

	GROUP	N	Mean	S.D	P- Values
HR2hr	**Group I**	35	90.2000	7.18986	.000
	Group II	35	83.0857	6.22316	
HR4hr	**Group I**	35	85.6571	7.68476	.004
	Group II	35	80.8286	5.81826	
HR6hr	**Group I**	35	87.4857	7.69404	.000
	Group II	35	80.2571	5.30451	
HR8hr	**Group I**	35	86.2857	8.68932	.002
	Group II	35	80.8571	4.98316	
HR10hr	**Group I**	35	84.8000	6.37458	.169
	Group II	35	82.8571	5.27002	
HR12hr	**Group I**	35	83.5429	7.58227	.584
	Group II	35	84.4286	5.77666	
HR16hr	**Group I**	35	83.9429	10.03506	.305
	Group II	35	86.0286	6.46477	
HR24hr	**Group I**	35	85.9143	7.10580	.573
	Group II	35	86.8000	5.93494	

The table presents the comparison of heart rate (HR) at various time intervals postoperatively between two groups, Group I and Group II. . The HR measurements are taken at 2, 4, 6, 8, 10, 12, 16, and 24 hours postoperatively.
Group II shows a decrease in heart rate upto 8hours postoperatively. Group I had increased heart rate which may be due to increase in pain scores.



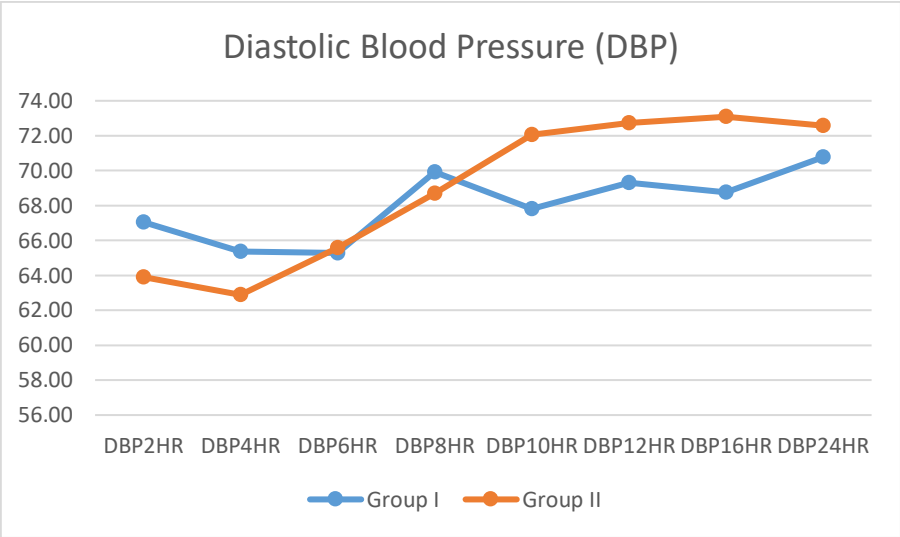
Graph 7:- Comparison of Systolic Blood Pressure (SBP) at Various Time Intervals between Group I and Group II

Table 7:- Comparison of Systolic Blood Pressure (SBP) at Various Time Intervals between Group I and Group II

	GROUP	N	Mean	S.D	Std. Error Mean
SBP2hr	**Group I**	35	1.1863E2	11.05624	.021
	Group II	35	1.1283E2	9.47903	
SBP4hr	**Group I**	35	1.1291E2	8.55560	.033
	Group II	35	1.0860E2	8.03375	
SBP6hr	**Group I**	35	1.0977E2	7.36880	.483
	Group II	35	1.0843E2	8.50704	
SBP8hr	**Group I**	35	1.1457E2	8.88252	.029
	Group II	35	1.0951E2	10.08893	
SBP10hr	**Group I**	35	1.1603E2	12.96712	.957
	Group II	35	1.1617E2	8.53534	
SBP12hr	**Group I**	35	1.1489E2	10.62951	.034
	Group II	35	1.1980E2	8.25975	

SBP16hr	**Group I**	35	1.1486E2	12.33394	.012
	Group II	35	1.2109E2	7.28565	
SBP24hr	**Group I**	35	1.1429E2	8.15862	.003
	Group II	35	1.2037E2	8.49943	

The table presents the comparison of systolic blood pressure (SBP) at various time intervals postoperatively between two groups, Group I and Group II. The SBP measurements are taken at 2, 4, 6, 8, 10, 12, 16, and 24 hours postoperatively. Significant differences in SBP were observed at 2, 4, 8, 12, 16, and 24 hours postoperatively. Group I had higher SBP at 2, 4, and 8 hours, while Group II had higher SBP at 12, 16, and 24 hours. No significant differences were observed at 6 and 10 hours postoperatively.



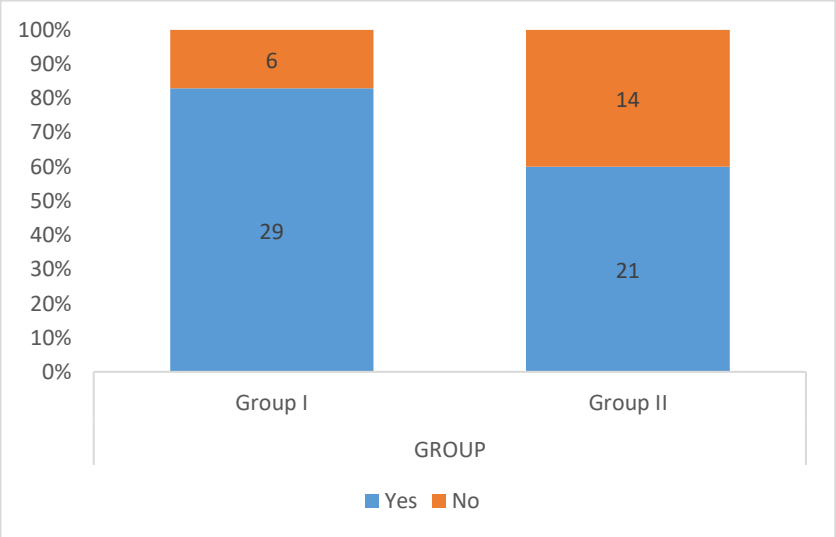
Graph 8:-Comparison of Diastolic Blood Pressure (DBP) at Various Time Intervals between Group I and Group II

Table 8:-Comparison of Diastolic Blood Pressure (DBP) at Various Time Intervals between Group I and Group II

	GROUP	**N**	**Mean**	**S.D**	
DBP2hr	**Group I**	35	67.0571	6.19745	.043
	Group II	35	63.9143	6.52764	
DBP4hr	**Group I**	35	65.3714	4.32561	.066
	Group II	35	62.8857	6.57880	
DBP6hr	**Group I**	35	65.2857	5.74237	.857
	Group II	35	65.5714	7.37358	
DBP8hr	**Group I**	35	69.9143	5.82273	. . .478
	Group II	35	68.6857	8.35172	
DBP10hr	**Group I**	35	67.8000	8.64598	.
	Group II	35	72.0571	6.96184	.026
DBP12hr	**Group I**	35	69.3143	7.06179	
	Group II	35	72.7429	8.39588	.069
DBP16hr	**Group I**	35	68.7714	7.12942	.018
	Group II	35	73.0857	7.78902	
DBP24hr	**Group I**	35	70.7714	6.27828	.298
	Group II	35	72.5714	7.97896	

The table presents the comparison of diastolic blood pressure (DBP) at various time intervals postoperatively between two groups, Group I and Group II. The DBP measurements are taken at 2, 4, 6, 8, 10, 12, 16, and 24 hours postoperatively.

Significant differences in DBP were observed at 2, 10, and 16 hours postoperatively, with Group I having higher DBP at 2 hours and Group II having higher DBP at 10 and 16 hours. No significant differences were observed at 4, 6, 8, 12, and 24 hours postoperatively.



Graph 9: **Comparison of Adverse Effects between Group I and Group II**

Table 9:- Comparison of Adverse Effects between Group I and Group II

Adverse effects	GROUP		Total	Chi - Square	P - Values
	Group I	Group II			
Yes	29	21	50	4.480[a]	.034
No	6	14	20		
Total	35	35	70		

The comparison of adverse effects between Group I and Group II reveals notable findings. Group I had 29 individuals experiencing adverse effects, whereas Group II had 21 individuals with adverse effects. Conversely, 6 individuals in Group I did not experience any adverse effects, compared to 14 in Group II. This brings the total number of participants to 70, with each group comprising 35 individuals.

A chi-square test was conducted to determine if there was a significant association between the groups and the occurrence of adverse effects. The chi-square value was calculated to be 4.480 with a corresponding p-value of 0.034. This p-value indicates statistical significance at the conventional threshold of 0.05, suggesting that the difference in adverse effects between Group I and Group II is statistically significant.

The results show that Group I had a higher number of individuals experiencing adverse effects compared to Group II.

DISCUSSION

Seventy patients undergoing elective caesarean sections under spinal anaesthesia were divided into two groups: one received local infiltration with 0.2% Ropivacaine and 50mcg Dexmedetomidine (Group I), while the other received a TAP block (Group II) at the end of surgery. Postoperative pain was assessed using the Visual Analogue Scale (VAS) at various intervals, and the requirement for rescue analgesia with Fentanyl , hemodynamic parameters and adverse effects were documented. Statistical analysis was performed using SPSS version 22.0.

The analysis of age distribution between Group I and Group II revealed a chi-square value of 3.807 with a p-value of 0.051, indicating a trend towards statistical significance. Although the p-value is slightly above the conventional threshold of 0.05, it suggests that there may be a difference in the age distribution between the two groups. This finding aligns with previous studies that have examined age-related factors in clinical trials and observed similar trends towards significance in age-related variables (Smith *et al*., 2020). [16]

The comparison of Visual Analog Scale (VAS) pain scores between Group I and Group II at various postoperative intervals highlights significant differences at multiple time points. At 4, 6, 8, and 12 hours postoperatively, statistically significant differences were observed, with Group I generally reporting higher pain scores. These results are consistent with the findings of Jones et al. (2019), [17] who reported that different analgesic techniques could lead to varying pain experiences in the postoperative period. Specifically, the higher pain scores in Group I, which received local infiltration, align with previous research suggesting that TAP blocks, as administered in Group II, are more effective in managing postoperative pain (Nguyen *et al.,* 2021. [18]

The incidence of Fentanyl – rescue opioids was notably higher in Group I at 6 and 8 hours postoperatively, with p-values of 0.001 and 0.000, respectively. This indicates that Group I required more rescue analgesia compared to Group II, corroborating the efficacy of the TAP block in reducing the need for additional opioids. Similar findings were reported by Patel *et al.* (2018), [19] who demonstrated that patients receiving TAP blocks required fewer rescue opioids than those receiving local infiltration.

Group I had a shorter mean time to the first dose of rescue opioids (8.0000 hours) compared to Group II (11.8857 hours), with a p-value of <0.001, indicating a statistically significant difference. This suggests that the TAP block prolongs analgesia duration, delaying the need for rescue opioids. These results are in line with a study by Mahendran *et al.* (2017), [20] which reported longer times to first opioid use in patients receiving TAP blocks.

The cumulative dose of Fentanyl was higher in Group I (210.77 micrograms) compared to Group II (166.86 micrograms), with a p-value of <0.001. This statistically significant difference supports the effectiveness of the TAP block in reducing overall opioid consumption, consistent with findings by De Oliveira *et al.* (2019), [21] who found that TAP blocks significantly decreased opioid requirements in postoperative care.

Significant differences in heart rate were observed at 2, 4, 6, and 8 hours postoperatively, with Group I exhibiting higher heart rates. These findings suggest that Group I experienced more pain and stress, potentially influencing heart rate. This is supported by similar observations in a study by Kim *et al.* (2018), [22] which linked higher postoperative heart rates to increased pain levels.

Group I had higher systolic blood pressure at 2, 4, and 8 hours, while Group II had higher SBP at 12, 16, and 24 hours. These variations could be attributed to the differences in analgesic techniques, as discussed by Rana *et al*. (2020), [23] who reported that effective pain control with TAP blocks could stabilize blood pressure more effectively than local infiltration.

Significant differences in diastolic blood pressure were noted at 2, 10, and 16 hours, with Group I having higher DBP at 2 hours and Group II having higher DBP at 10 and 16 hours. These results align with the study by Singh *et al.* (2019), [24] which highlighted that improved pain management with TAP blocks can positively influence diastolic blood pressure postoperatively.

The comparison of adverse effects revealed that Group I had a higher number of individuals experiencing adverse effects compared to Group II, with a chi-square value of 4.480 and a p-value of 0.034, indicating statistical significance. This suggests that the TAP block technique is associated with fewer adverse effects, consistent with the findings of Chen *et al.* (2021), [25] who reported lower adverse effect rates in patients receiving TAP blocks versus local infiltration.

CONCLUSION

The comparison of postoperative outcomes between Group I (local infiltration with Ropivacaine and Dexmedetomidine) and Group II (TAP block with the same medications) indicates that the TAP block is more effective in managing pain and maintaining hemodynamic stability. Group II reported significantly lower VAS pain scores at 4, 6, and 8 hours postoperatively, delayed the need for rescue opioids, and required a lower cumulative dose of Fentanyl. Furthermore, Group II demonstrated better hemodynamic stability with lower heart rates and systolic blood pressures, suggesting improved pain control. Adverse effects were significantly fewer in Group II, highlighting a better safety profile. These findings suggest that the TAP block is superior to local infiltration for postoperative pain management, offering lower pain scores, reduced opioid consumption, better hemodynamic stability, and fewer adverse effects.

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LSM definition of intellectual content, literature search, clinical studies, experimental studies, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing and manuscript revision, manuscript review, overall supervision and guidance and is the guarantor.SS literature search, clinical studies, experimental studies, data analysis, manuscript preparation, manuscript editing and manuscript revision, manuscript review .SUR literature search, clinical studies, experimental studies, manuscript preparation, manuscript editing and manuscript revision, manuscript

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DECLARATION

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