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Analgesic effect of paracetamol as an adjuvant to lignocaine in upper limb surgeries under intravenous regional anaesthesia (IVRA)

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Abstract
Background: Intravenous regional anaesthesia (IVRA) ia simple, most reliable, has less economic burden with 95-98% success rate in upper limb surgeries. Multiple drug combinations have been used to achieve few systemic adverse effects and to increase the postoperative analgesia. This study was aimed to assess the efficacy of lignocaine alone and lignocaine with paracetamol as adjuvant in upperlimb surgeries under inravenous regional anaesthesia.
Materials and methods: A total 120 cases belong to ASA grade I or II, between age group 21-60 years undergoing upper limb surgeries were divided into two groups. Group A administered with 2% lignocaine (10 ml) with paracetamol (30 ml) and group 2 administered with 10ml 2% lignocaine with normal saline (30ml). Onset of motor and sensory blockade and recovery duration, intraoperative pain assessment by using 10 cm visual analogue scale, utilization of intra operative analgesia and need of post-operative analgesia, Post-operative patient satisfaction were evaluated.
Results: The duration of onset (p=0.002) and recovery (p=0.016) of sesory block and motor block among two group was statistically significant. Intra operative VAS score difference among the two groups was statistically significant (p=0.002). Intra operative requirement of fentanyl was more in group B than group A, which was statistically significant (p=0.041). In lignocaine with paracetamol group, patient satisfaction was graded as good in 76.7% cases and excellent in 18.3% cases.
Conclusion: Paracetamol to lignocaine as adjuvant in intravenous regional anaesthesia was effective than the lignocaine alone. The durg combination minimizes the duration of onset of sensory block, intraoperative requirement of analgesia and enhances the analgesic effect of lignicaine.

Keywords: lignocaine, paracetamol, sensory block, motor block, postoperative analgesia.

Introduction
Intravenous regional anaesthesia (IVRA) is the preferable technique in upper limb surgeries. IVRA is simple, safe, most reliable, ease to administer, cost effective procedure and shor hospitalization period [1, 2]. Besides, IVRA had disadvantages like poor muscle relaxation, delayed onset of action, tourniquet pain and poor in prolonged post operative analgesia [3, 4]. Different drug combinations and adjuvants like tramadol, fentanyl, clonidine, dexamethasone etc. have been used to achieve few systemic adverse effects and to increase the postoperative analgesia [5].
Paracetamol has anti-inflammatory property, effect on central nervous system and peripheral antinociceptive properties in different pain models [6]. Studied demonstrated that paracetamol as an adjuvant improves post operative analgesia when added to lignocaine in IVRA [7]. The present study was designed to assess the efficacy of lignocaine alone and lignocaine with paracetamol as adjuvant in upperlimb surgeries under inravenous regional anaesthesia.

Materials and Methods
The present prospective randomised double blind study was conducted in Department of Anaesthesiology, S.V.S Medical College, Mahabubnagar during April 2018 to August 2019. A total 120 cases between age group 21-60 years undergoing upper limb surgeries were recruited. Cases belong to ASA grade I or II, undergoing upperlimb surgeries with maximum 60 minutes and willing to participate in the study were included, cases undergoing >60 minutes of upper limb surgeries, allergy to the local anaesthetics and not willing to participate were excluded.
Informed consent was obtained from all the study participants and study protocol was approved by institutional ethic committee. All the study participants were randomly divided

into two groups. Group A administered with 2% lignocaine (10 ml) with paracetamol (30 ml) and group 2 administered with 10ml 2% lignocaine with normal saline (30ml). Parameters like onset of motor and sensory blockade and recovery duration, intraoperative pain assessment by using 10 cm visual analogue scale, utilization of intra operative analgesia and need of post-operative analgesia were assessed. Post-operative patient satisfaction was evaluated and graded as excellent, good, moderate and poor. The data was collected into Microsoft Office Excel 2010. The processes of exporting the coded data from excel to SPSS version 20.0 was employed.

Results

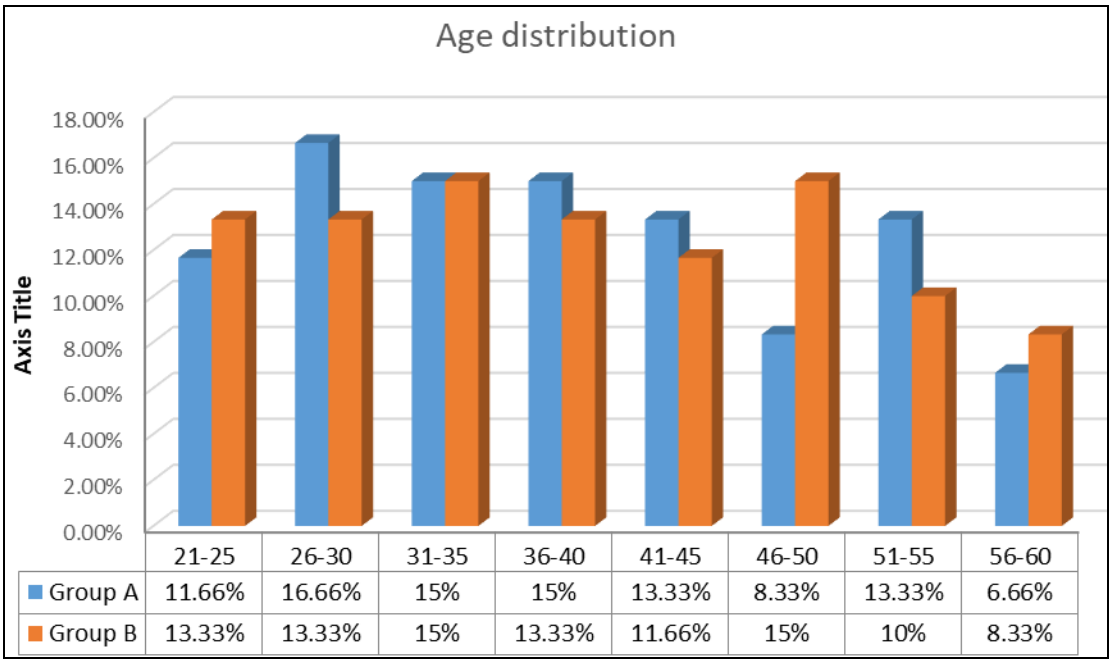

Fig 1: Age wise distribution of study participants

Table 1: Details of demographic parameters and surgical procedures in study participants

Parameters	Gropu A		Group B		p-value
	Number	Percentage	Number	Percentage	
Gender					
Male	38	63.3%	46	76.7%	0.252
Female	22	36.7%	14	23.3%	
ASA Grade					
Grade I	42	70%	45	75%	0.548
Grade II	18	30%	15	25%	
Type of surgical procedure					
Suturing	03	5%	01	1.67%	0.472
K wire fixation	38	63.3%	36	60%	
Carpal tunnel repair	12	20%	15	25%	
Ganglion Excision	07	11.67%	08	13.3%	

Table 2: Duration of onset and recovery of sensory and motor blockade

Onset/Recovery	Group A	Group B	p-value
	Mean±SD	Mean±SD	
Duration of Sensory block (In min)			
Onset	5.91±2.04	6.84±2.12	0.002
Recovery	7.64±1.67	6.19±1.72	0.016
Duration of Motor block (In min)			
Onset	8.66±2.77	11.98±2.87	0.027
Recovery	8.74±2.35	11.01±2.62	0.035
Intra-operative VAS score	2.54±1.37	3.25±1.98	0.002

Table 3: Details offentanyl intake in surgical procedure

Fentanyl intake	Group A	Group B	p-value
Intra operativeintake			
Required	06 (10%)	42 (70%)	0.041
Not required	54 (90%)	18 (30%)	
Intake quantity (In mcg) (Mean±SD)	8.89±18.2	35.6±27.8	0.002

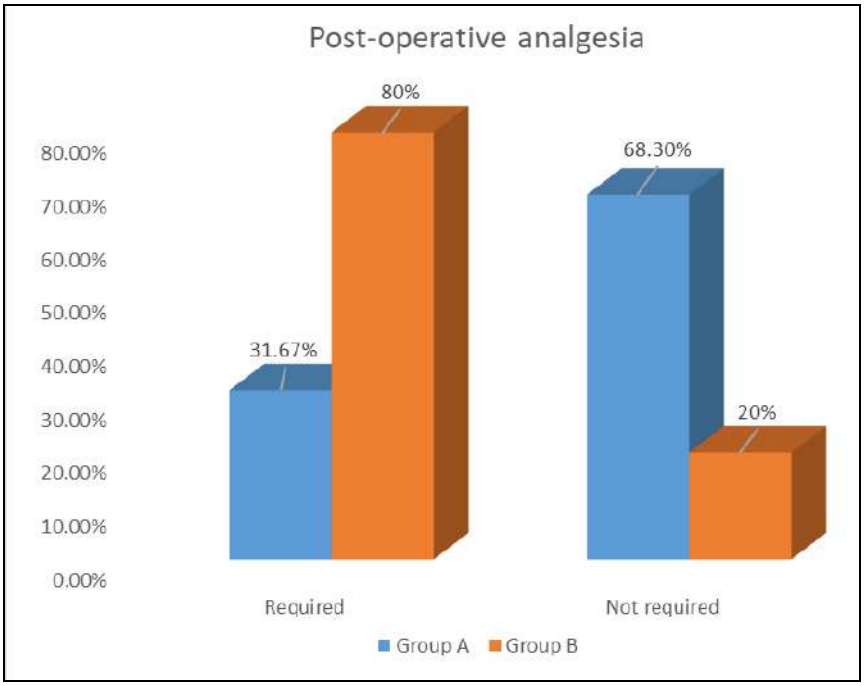

Fig 3: Post-operative requirement of analgesia

Table 4: Details of patient satisfaction rate

Satisfaction rate	Group A		Group B		p-value
	Number	Percentage	Number	Percentage	
Excellent	11	18.3%	04	6.67%	0.034
Good	46	76.7%	31	51.67%	
Moderate	03	5%	25	41.66%	
Poor	NIL	-	NIL	-	

Discussion

Intra venous regional anaesthesia (IVRA) has benefits such as minimal haemorrhage risk, safe, reliable and cost effective. Surgeries to the upper limb can be done under general anaesthesia or through nerve block or through regional anaesthesia by IVRA [8, 9]. Besides the benefits, it is poor in prolonged post operative analgesia and muscle relaxation [10]. To avoid this many adjuvants have been added to local anaesthetics [11]. This study was designed to assess the efficacy of lignocaine alone and lignocaine with paracetamol as adjuvant in upperlimb surgeries under inravenous regional anaesthesia. In this study, study participants were randomply distributed in to 2 groups based on drug administration. The difference among gender (p=0.252) and ASA grade (p=0.548) was statistically not significant. K-wire fixation (group A 63.3%, group B 60%) was common surgical procedure followed by carpel tunnel repair (group A 20%, group B 25%) in two study groups.

The mean onset duration of sensory block in group A was 5.91±2.04 and in group B was 6.84±2.12. Whereas, the mean duration of recovery time in group A was 7.64±1.67 and in group B was 6.19±1.72. The duration of onset (p=0.002) and recovery (p=0.016) of sesory block among two group was statistically significant. The mean onset duration of motor block in group A was 8.66±2.77 and in group B was 11.98±2.87. The mean recovery duration of motor block in group B was 8.74±2.35 and in group B was 11.01±2.62 (Table 2). Sudy by Pankaj Kumar *et al*., found no significant difference in onset of sesory block ($P>0.05$) and recovery duration was significantly longer among groups ($P<0.05$). Similarly, onset duration of motor block was shorter and recovery duration was longer ($P<0.05$) [12]. Study by Huseyin Sen *et al*., found no significant difference in the onset of sensory block among study groups ($p>0.05$), whereas recovery time was significantly longer in group 2 ($P<0.05$). As the same, onset duration of motor block was shorter and recovery duration was longer ($P<0.05$) [13]. Celik M *et al*., found that onset and recovery times of sensory block and motor block was similar in both groups [11]. Study by Amar prakash Kataria *et al*., stated that onset of sensory and motor block was significantly lower in lignocaine with paracetamol group than lignocaine alone group ($P<0.001$). The recovery duration of sensory block and motor block was similar in both groups ($P<0.05$) [14]. Reda K. Abdel-Rahman *et al*., found no statistical significant difference in onset and recovery of sensory block and motor block between lower in lignocaine with paracetamol group than lignocaine only group [15]. Mehrdad Noroozi *et al*., staed that the mean duration of sensory block was statistically significant among study goups ($P<0.001$) [16]. Sen H *et al*., stated that onset duration of motor block was shorter and recovery duration of motor and sensory block was significantly longer in lidocaine and paracetamol group [17]. Study by Vishala G *et al*., stated that onset duration of sesory block was not significant ($p>0.05$) and recovery duration of sesory block was statistically significant ($P<0.05$). The mean duration of onset and recovery of motor block was statistically significant ($P<0.05$) [18]. Study by Sulekha S *et al*., found onset duration of sensory and motor block was shorter and sensory recovery time was longer in group 1 ($P<0.001$) [19].

In this study, intra operative VAS score in group A was 2.54±1.37 and in group B was 3.25±1.98. The difference among the two groups was statistically significant

(p=0.002). Intra operative requirement of fentanyl was more in group B than group A, which was statistically significant (p=0.041). The mean intake quantity of fentanyl in group A was 8.89±18.2 and in group B was 35.6±27.8. The difference was statistically significant (p=0.002). Study by Pankaj Kumar *et al*., stated intraoperative VAS score was significantly lower in group 2 ($P<0.05$) and intraoperative analgesic requirement was significantly lower in group 2 ($P<0.05$) [12]. Intraoperative VAS score were significantly lower in group 2 ($P<0.05$). Intra operative requirement of fentanyl was significantly lower in group 2. Study by Huseyin Sen *et al*., found no significant difference in the intraoperative VAS score [13]. The mean intraoperative VAS pain score was 2.17±1.62 in Group 1 and 3.80±2.36 in Group 2. The p-value 0.003 showed that there is a statistically significant difference in the intraoperative VAS score between the two groups [19].

In group A, 76.7% cases had good satisfaction rate followed by excellent rate in 18.3%. In group B, 41.66% case had moderate satisfaction rate and 51.67% case had good satisfaction rate (Table 4). The difference was statistically significant (p=0.034). Study by S Sulekha stated that patient satisfaction rate was statistically significant between two groups ($P<0.05$) [19].

Conclusion

The study results concluded that, the addition of paracetamol to lignocaine as adjuvant in intravenous regional anaesthesia was effective than the lignocaine alone. The durg combination minimizes the duration of onset of sensory block, and intraoperative requirement of analgesia. In this study, onset and recovery duration of sensoy & motor blocks and intraoperative analgesia requirements were statistically significant ($P<0.005$). Post operative requirement of analgesia was less in group B when compared group B. In lignocaine with paracetamol group, patient satisfaction was graded as good in 76.7% cases and excellent in 18.3% cases.

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