

Original Research Article

Comparison of Oral Pregabalin and Gabapentin on Post Operative Pain Relief in Patients Undergoing Upper Limb Orthopaedic Surgeries: A Prospective Randomized Study

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Abstract

Background: Effective post operative pain control is an important aspect of surgery. Pregabalin and gabapentin are effective in neuropathic pain. They are also being popular in multimodal analgesia to provide post operative pain relief.

Aim: To compare the effectiveness of oral Pregabalin vs Gabapentin on post operative pain relief in patients undergoing upper limb orthopaedic surgeries.

Materials and Methods: A total of 60 candidates for elective upper limb surgeries were randomly assigned to gabapentin (n = 30), pregabalin (n = 30), groups. Patients received 800 mg of gabapentin or 150 mg of pregabalin orally one hour before surgery.. Hemodynamic variables, VAS scores, amount of rescue analgesia and side effects were monitored and compared between the groups.

Results: VAS score was less in Pregabalin Group as compared to Gabapentin group. The amount of rescue analgesic administered was also less in Pregabalin group. There was no statistically significant difference between hemodynamic variables and side effects among the groups.

Conclusion: Pregabalin was more effective than Gabapentin in post operative pain relief.

Key Words: Orthopedic upper limb surgeries, Gabapentin, Pain, Pregabalin.

1. INTRODUCTION

Postoperative pain management has become an important aspect of patient care. In today's scenario opioids are most commonly used to prevent post operative pain but they do have some side effects such as nausea, vomiting, drowsiness, itching, and urinary retention etc^[1]. Nonsteroidal anti inflammatory drugs (NSAIDs) are another class of drugs used for management for postoperative pain but they are also associated with severe side effects such as renal toxicity, allergic reactions, and heart failure. ^[2] Therefore multimodal analgesia is very effective in preventing the postoperative pain and reducing the associated side effects of individual drugs. It involves preventing peripheral and central sensitization associated with surgical stimulation ^[3]. Examples of these drugs are gabapentin and pregabalin. Gabapentin

and pregabalin are analog of gamma amino butyric acid(GABA) . They have analgesic, anxiolytic and antiepileptic properties. These drugs bind to the $\alpha 2$ - δ -1 subunit of voltage-dependent calcium channels in the central nervous system and thus cause reduced release of excitatory neurotransmitters like glutamate, substance P, norepinephrine which are responsible for pain. Pregabalin has a greater analgesic effect than gabapentin in the case of neuropathic pain, diabetic peripheral neuropathy ^[4] and postherpetic neuralgia ^[5]. It also has increased bioavailability, and more rapid absorption, .However, these drugs also have side effects such as somnolence, dizziness, nausea, and vomiting. ^{[6][7]} This study evaluated the effects of pregabalin and gabapentin on postoperative pain in patients undergoing upper limb orthopaedic surgeries.

Aims and Objectives

1. To compare the efficacy of Pregabalin and Gabapentin given preoperatively on post operative pain.
2. To compare Hemodynamic variables such as SBP, DBP, Map, Spo2 , Pulse rate among the groups.
3. To compare side effects if any.

2. MATERIALS AND METHODS

This was a double blinded randomized controlled study, conducted over a period of 6 months.

Inclusion criteria: Age 20-60 Years, Undergoing elective orthopaedic surgery on upper limb, belonging to ASA grade I and II.

Exclusion criteria: Unwillingness to participate, Severe hemodynamic instability, Acute or chronic kidney disease, Alcohol, drug use, Neuropsychological diseases, Sensitivity to Pregabalin or Gabapentin.

60 patients undergoing elective orthopaedic surgery on upper limb between the age of 20 and 60 years with ASA grade I or II were selected and enrolled in this randomized, double-blind clinical trial study. After obtaining informed consent, patients were divided into two groups using a random number table: gabapentin (n = 30), pregabalin (n = 30),. Patients received 800 mg of gabapentin(Group G) or 150 mg of pregabalin (GroupP) orally one hour before surgery in the gabapentin and pregabalin groups, respectively. This was a double blinded study. In this study, the surgeon, patient, and postoperative pain controller did not know what medication was administered.

All patients were subjected to standard monitoring at the beginning of entering the operating room, including blood pressure, heart rate, pulse oximetry. An intravenous catheter (no.18)was inserted into all patients and 500 ml of Ringer's lactate was administered. Midazolam 1 mg was injected as a premedication for all patients. Propofol 2 mg/kg and atracurium 0.5 mg/kg were used to induce anaesthesia. Propofol 100 mg/kg/min was used to maintain anaesthesia and intermittent amounts of atracurium were used. After rechecking the vital signs and ensuring the appropriate depth of anaesthesia, surgeons were given permission to begin the surgery. Surgery was performed by several orthopaedic surgeons under a unique approach. At the end of surgery after extubation and ensuring adequate ventilation, patients were transferred to the recovery care unit for 2 hours and then to the ward. Postoperatively degree of pain was measured based on the Visual Analogue Scale and when the patient experienced pain more than 4 on VAS, rescue analgesia was given in the form of Inj. Tramadol (1mg/kg). The pain score was recorded at 1st , 2nd ,3rd ,4th ,5th and 12th hour post-operatively. The total amount of rescue analgesia required in each group was noted.

Occurrence of side effects were recorded and documented. This information, together with the demographic characteristics of the patients and the duration of surgery, were analyzed using SPSS software. Data were analyzed using a repeated measurement test, one-way ANOVA test, chi square test,. P values less than 0.05 were considered statistically significant.

3. RESULTS

The demographic characteristics were comparable between the groups, no statistical significant difference ($p>0.05$) was observed between the groups.(Table 1).

Pulse rate for the patients was monitored from the time of induction till 6 hours in the post-operative period. It was found that the pulse rate was almost similar in both pregabalin and gabapentin group, p value was >0.05 and the difference was statistically insignificant and a similar type of observation was also seen with mean arterial pressure (Figures 1 and 2).

Post-operatively patients pain perception was assessed using VAS scoring system, it was monitored from the first hour of the post-operative period up to 12 hours at regular intervals and it was observed that the pain score was less in the pregabalin group at all intervals compared to gabapentin group and the difference was found to be statistically significant ($p<.05$) (Table 2).

Post-operatively tramadol in the form of rescue analgesic was used for attenuation of pain and it was observed in our study that amount of tramadol requirement was more in the gabapentin group and as compared to pregabalin group and the difference was found to be statistically significant ($p<.05$) (Table 3).

The occurrence of adverse events such as somnolence and dizziness was almost similar in both the groups whereas the incidence of nausea and vomiting was less in pregabalin group compared to gabapentin group but the difference was found to be statistically insignificant ($p>.05$) (Table 4).

Table 1: Demographic Variables

	Group P	Group G	P value
Age (years)	45.23±9.99	43.9±10.56	0.414
Height(cms)	162.26±3.33	163.03±3.24	0.370
Weight (kgs)	70.87±6.5	71.93±9.54	0.375
Gender	Male = 20 Female =10	Male = 19 Female = 11	0.71
Duration of surgery(mins)	69.87±6.5	70.93±9.54	0.9
ASA Grade	Grade I= 14 Grade II= 16	Grade I= 17 Grade II= 13	0.44

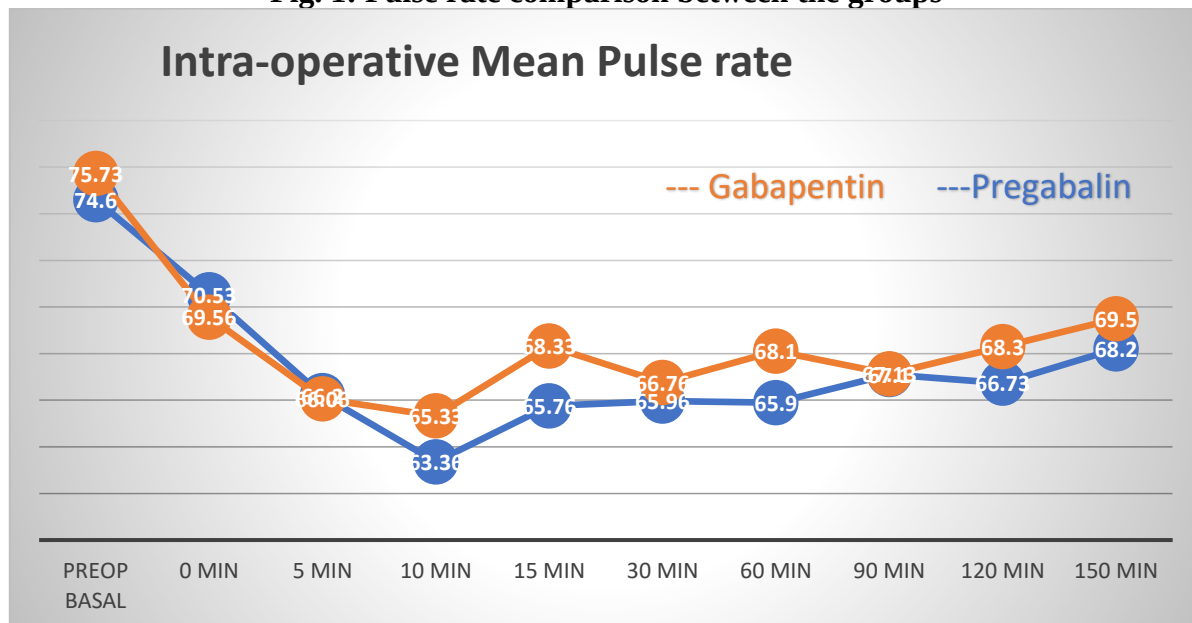
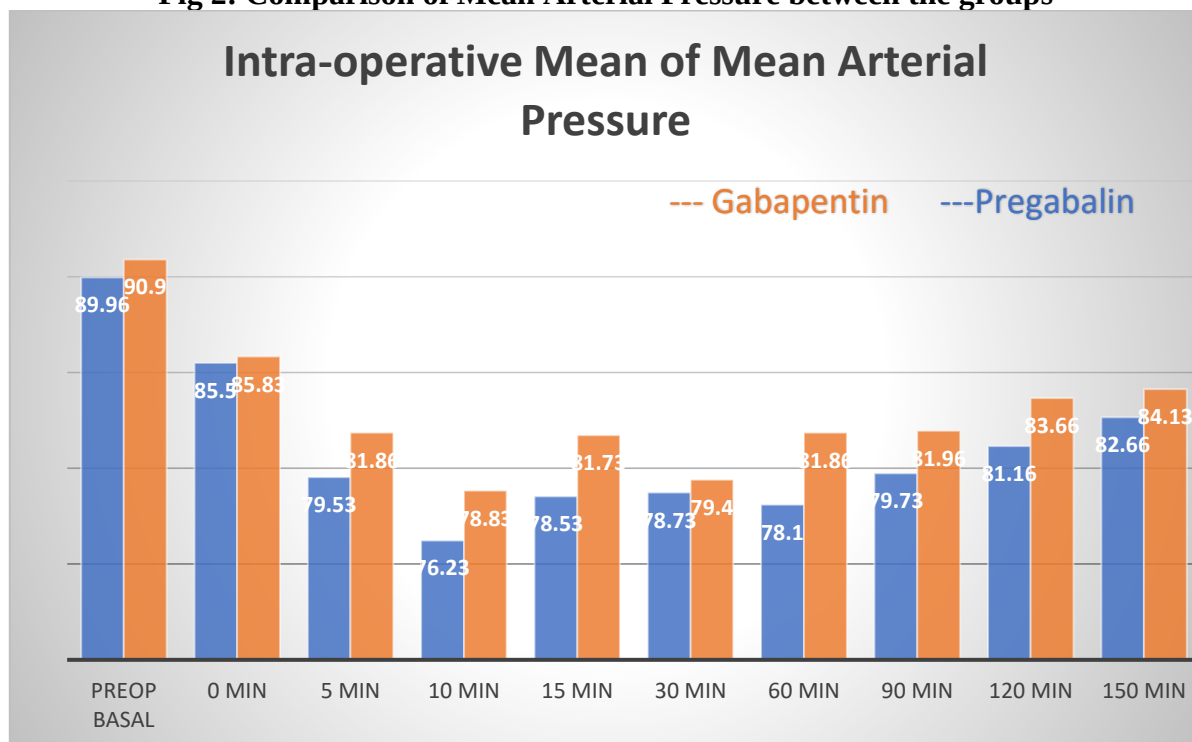
Fig. 1: Pulse rate comparison between the groups**Fig 2: Comparison of Mean Arterial Pressure between the groups**

Table 2: Comparison of VAS scores among the groups

Duration (hrs)	Group P	Group G	P value
1	3±0.5	3.8±0.25	<0.05
2	2.8±0.6	3.26±0.44	<0.05
3	2.8±0.25	2.9±0.92	<0.05
4	1.7±0.46	2.4±1.32	<0.05
6	1.6±0.75	2.3±0.47	<0.05
12	1.6±0.8	2.5±0.6	<0.05

Table 3: Comparison of total dose of rescue analgesia required in the groups

Duration (hrs)	Group P (mean dose of tramadol in mgs)	Group G ((mean dose of tramadol in mgs)	p value
1	24.2	34.3	<0.05
2	17.6	28.8	<0.05
3	10.2	16.2	<0.05
4	7.3	11.2	<0.05
6	3.3	4.6	<0.05
12	2.1	5	<0.05

Table 4: Comparison of Side effects among the groups

Side effects	Group P	Group G	P value
Nausea and Vomiting	10	12	>0.05
Respiratory depression	0	0	>0.05
Dyspnoea	0	0	>0.05
Somnolence	12	14	>0.05
Dizziness	4	6	>0.05

4. DISCUSSION

Effective post operative pain control is a major aspect of surgery. It depends on various factors such as duration of surgery, type of anaesthesia and analgesia used during surgery, patients mental and emotional condition. [8]

Due to various adverse events of opioids, their usage has been minimized. Pre-emptive analgesia is being implemented more in today's scenario. It reduces the perception of post-operative pain by preventing central and peripheral sensitization of noxious stimuli and resulting hyperalgesia. [9][10]

Pregabalin and Gabapentin are the drugs most commonly used in the treatment of neuropathic pain. Some studies have also shown their use in the management of post-operative pain [11][12]

We conducted this study comparing these two drugs efficacy on the management of post operative pain.

In our study the hemodynamic parameters such as pulse rate and mean arterial pressure were comparable in both the pregabalin and gabapentin group (p >0.05) and the difference was statistically insignificant. Similar findings were seen in the studies done by Saraswat et al.,

Tippana et al. and Van Elstraete AC et al.^{[9][10][11]}

In our present study we assessed the pain perception by using VAS pain scale from the first hour of the post-operative period till 12 hours and it was found that the VAS score for the patients in the pregabalin group was significantly less when compared to the gabapentin group, p was <0.05 and the difference was statistically significant. Hence pregabalin given in the pre-operative period was more effective in controlling the post-operative pain for a longer duration compared to gabapentin. Our results are almost in accordance with the study done by Sahu et al.^[12] and Swarup Paul et al.^[13].

In our study the total amount of rescue analgesic used in the post-operative period was more in the gabapentin group compared to pregabalin group ($p<0.05$) and the difference was found to be statistically significant. The rescue analgesic used in our study was tramadol. Similar findings were seen in the studies done by Joshi GP^[14], Taylor CP^[15] and Gayathri K B et al.^[16].

The incidence of nausea and vomiting was less in the pregabalin group as compared to the gabapentin group, although p was >0.05 and the difference was statistically insignificant. Respiratory depression and dyspnoea was not seen in either of the groups. Incidence of somnolence and dizziness was less in pregabalin group compared to gabapentin group ($p>0.05$) but the difference was not found to be statistically significant. Similar findings were seen in the study conducted by Gajraj et al.^[17]. In another study done by Turan et al.^[18], found that the incidence of nausea and vomiting are significantly lower in pregabalin and gabapentin group compared to placebo group, for which the reason was mentioned as due to lesser dose of rescue analgesic given in these two groups.

Conclusion

This study concluded that both Pregabalin and gabapentin had an effect on reducing the post operative pain. Pregabalin due to increased bioavailability and rapid absorption was more effective than gabapentin. Also the total dose of rescue analgesia administered was less in pregabalin group.

Hemodynamic variables and side effects were comparable in both the groups.

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Conflict of interest: Nil

5. REFERENCES

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