e-ISSN: 0975-9506, p-ISSN:2961-6093

Available online on www.ijpqa.com

International Journal of Pharmaceutical Quality Assurance 2025; 16(12); 20-24

Original Research Article

A Randomized Controlled Trial of Gray Rami Communities Block Versus Conventional Methods in Chronic Low Back Pain

Saumen Kumar De

Associate Professor, MBBS (C.U), DNB (PMR), MPhil (WBUHS), FIPM (WBUHS), CBET-USG (WBUHS), Department of Physical Medicine and Rehabilitation, Nil Ratan Sircar Medical College and Hospital, 138, Acharya Jagdish Chandra Bose Road, Sealdah, Kolkata, West Bengal, Pin Code: 700014, India

Received: 01-10-2025 / Revised: 15-11-2025 / Accepted: 03-12-2025
Corresponding Author: Dr. Saumen Kumar De
Conflict of interest: Nil

Abstract

Introduction: Up to 80% of people will experience chronic low back pain (CLBP) at some point in their lives, making it one of the most common musculoskeletal conditions in the world. CLBP has a complex aetiology that frequently includes ligamentous instability, facet joint arthropathy, intervertebral disc degeneration, and sympathetic nervous system involvement.

Aims: The study aimed to evaluate the efficacy of Gray Rami Communicantes Block (GRCB) in alleviating pain and improving functional outcomes in patients with chronic low back pain, while also comparing changes in pain scores, disability indices, serum biomarkers, and adverse events between the GRCB group and those receiving standard therapy.

Materials & Methods: This prospective, randomized, controlled clinical study was conducted over one year (from 1st August 2023 to 31st July 2024) and included 32 patients with chronic low back pain.16 in Gray Rami Communicantes Block (GRCB)and 16 in control group (received conventional management only).

Result: In our study of 32 patients, the GRCB group (n = 16) showed significantly better clinical outcomes than controls (n = 16), with 10 patients (62.5%) markedly improved, 4 (25%) moderately improved, and 2 (12.5%) slightly improved, while none worsened. In the control group, only 2 (12.5%) were markedly improved, and 3 (18.8%) showed no change or worsening ($p < 0.001$).

Conclusion: We came to the conclusion that Gray Rami Communicantes Block (GRCB) was quite effective at treating persistent low back pain. Because both groups were similar at baseline, the evaluation was objective.

Keywords: Pain management, Serum Biomarkers, Oswestry Disability Index and Chronic Low Back Pain.

Introduction

Up to 80% of people will experience chronic low back pain (CLBP) at some point in their lives, making it one of the most common musculoskeletal conditions in the world. Due to medical expenses and lost productivity, it is a major contributor to disability, a lower quality of life, and a substantial financial burden [1]. CLBP has a complex aetiology that frequently includes ligamentous instability, facet joint arthropathy, intervertebral disc degeneration, and sympathetic nervous system involvement [2]. The vertebral bodies, intervertebral discs, and paraspinal structures receive nociceptive innervation from the postganglionic sympathetic fibres that go through the Gray Ramus Communicans (GRC) [3]. Nociceptive fibres from lumbar discs and facet joints pass through the rami communicantes, according to anatomical and histological research, which makes them a possible target for interventional pain management [4]. The Gray Ramus Communicantes Block (GRCB) is being studied more and more as a minimally invasive treatment for CLBP discomfort. According to early research, patients with painful osteoporotic spinal compression fractures experienced substantial analgesia when the GRC was blocked [5]. According to Tae et al. [5], GRC nerve block successfully decreased pain scores in a group of 36 patients, with most patients experiencing long-lasting relief. In a similar vein, Jang et al. [6] found that individuals with symptomatic Schmorl's nodes experienced an improvement in radicular discomfort after rami communicans block. There is little data assessing the effectiveness of GRCB specifically in non-fracture chronic low back pain, even if these trials mostly concentrated on pain associated to fractures or radiculopathy. Interventional techniques aimed at the GRC or

lumbar sympathetic system have been investigated in recent clinical trials. In patients with chronic low back pain, Elawamy et al. [7] discovered that erector spinae and GRC blocks were useful in lowering pain intensity and enhancing functional outcomes. The safety and repeatability of ultrasound-guided GRC blocks were further emphasized by Tulgar et al. [8] and De Cassai et al. [9], highlighting their function in multimodal pain treatment techniques. Furthermore, compared to conventional therapy alone, Pourahmad et al. [10] showed that combining exercise-based physiotherapy with interventional blocks, such as GRCB, produced greater improvements in Visual Analogue Scale (VAS) and Oswestry Disability Index (ODI) ratings. The study aimed to evaluate the efficacy of Gray Rami Communicantes Block (GRCB) in alleviating pain and improving functional outcomes in patients with chronic low back pain, while also comparing changes in pain scores, disability indices, serum biomarkers, and adverse events between the GRCB group and those receiving standard therapy.

Materials and Methods

Type of Study: A prospective, randomized, controlled clinical study

Place of Study: Department of Physical Medicine and Rehabilitation, Nil Ratan Sircar Medical College and Hospital, 138, Acharya Jagdish Chandra Bose Road, Sealdah, Kolkata, West Bengal, Pin Code: 700014, India.

Study Duration: One year (from 1st August 2023 to 31st July 2024)

Sample Size: 32 chronic low back pain patients. 16 in Gray Rami Communicantes Block (GRCB) along with conventional management and 16 in control group (received conventional management only).

Inclusion Criteria

- Patients aged between 18 and 65 years.
- Diagnosed cases of chronic low back pain persisting for more than 3 months.
- Baseline Visual Analogue Scale (VAS) score ≥ 5.
- Inadequate response to conventional treatment.
- Clinical or radiological evidence of facet joint or sympathetic-mediated low back pain.
- Patients willing to give written informed consent and comply with study procedures.

Exclusion Criteria

- Patients with acute low back pain (<3 months duration).
- History of spinal surgery or spinal deformity.
- Presence of neurological deficits or radiculopathy.
- Evidence of infection, malignancy, or fracture involving the spine.
- Coagulopathy or patients on anticoagulant therapy.

Study Variables

- Demographic variables: Age, sex, and body mass index (BMI).
- Clinical variables: Duration of pain, baseline diagnosis, and pain characteristics.
- Pain assessment: Visual Analogue Scale (VAS) scores at baseline, 1 hour, 24 hours, 1 week, 4 weeks, and 8 weeks.
- Functional assessment: Oswestry Disability Index (ODI) at baseline, 1 week, 4 weeks, and 8 weeks.

Methods: Under fluoroscopic-guidance Gray Rami Communicantes Block (GRCB)performed with a total volume of 3 ml of 0.2% ropivacaine, 5mg dexamethasone and 40 mg of triamcinolone acetonide injected.

The tip of the 23 G spinal needle positioned at 5-10 mm anterior to the foramen and just above the roof of the foramen at the concerned spinal level and the position was confirmed with 0.5 cc contrast dye. Control group received only conventional conservative management.

Statistical Analysis: Data were entered into Excel and subsequently analyzed using SPSS and GraphPad Prism. Continuous variables were summarized as means with standard deviations, while categorical variables were presented as counts and percentages. Comparisons between independent groups were performed using two-sample t-tests, and paired t-tests were applied for correlated (paired) data. Categorical data were compared using chi-square tests, with Fisher's exact test applied when expected cell counts were small. A p-value of ≤ 0.05 was considered statistically significant.

Result

Table 1: Baseline Demographic and Clinical Characteristics

Parameter	GRCB Group	Control Group	P value
Age (years)	51.3 ± 8.5	49.6 ± 7.9	0.58
Sex (M/F)	09-07	08-08	0.73
BMI (kg/m²)	26.9 ± 3.4	27.1 ± 3.7	0.89
Duration of pain (months)	15.1 ± 4.6	14.8 ± 4.3	0.84
Baseline VAS	7.7 ± 0.9	7.6 ± 1.0	0.74
Baseline ODI (%)	53.4 ± 7.2	52.1 ± 7.6	0.65

Table 2: Pain Intensity (VAS Score Over Time)

Time Point	GRCB Group	Control Group	P value
Baseline	7.7 ± 0.9	7.6 ± 1.0	0.74
1 hour	3.5 ± 1.2	7.0 ± 1.1	<0.001
24 hours	3.0 ± 1.1	6.8 ± 1.2	<0.001
1 week	3.4 ± 1.0	6.6 ± 1.3	<0.001
4 weeks	3.9 ± 1.2	6.2 ± 1.1	<0.001
8 weeks	4.3 ± 1.4	6.0 ± 1.3	<0.001

Table 3: Functional Disability (Oswestry Disability Index %)

Time Point	GRCB Group	Control Group	P value
Baseline	53.4 ± 7.2	52.1 ± 7.6	0.65
1 week	38.2 ± 6.1	48.5 ± 7.3	<0.001
4 weeks	33.5 ± 6.7	46.2 ± 7.9	<0.001
8 weeks	30.8 ± 6.9	44.8 ± 7.4	<0.001

Table 4: Analgesic Consumption (Paracetamol Equivalent mg/day)

Time Point	GRCB Group	Control Group	P value
Baseline	1300 ± 230	1280 ± 210	0.74
1 week	620 ± 200	1120 ± 250	<0.001
4 weeks	700 ± 210	1050 ± 260	<0.001
8 weeks	760 ± 220	980 ± 240	0.002

Table 5: Patient Satisfaction (5-point Likert Scale)

Time Point	GRCB Group	Control Group	P value
1 week	4.4 ± 0.6	2.9 ± 0.7	<0.001
4 weeks	4.2 ± 0.7	2.8 ± 0.8	<0.001
8 weeks	4.1 ± 0.8	2.6 ± 0.9	<0.001

Table 6: Adverse Events

Adverse Event	GRCB Group (n, %)	Control Group (n, %)	P value
Local site pain	2 (12.5%)	0	0.14
Transient dizziness	1 (6.3%)	1 (6.3%)	1
Nausea	1 (6.3%)	2 (12.5%)	0.54
Infection	0	0	—

Table 7: Global Patient Improvement at 8 Weeks

Category	GRCB Group (n, %)	Control Group (n, %)	P value
Markedly improved	10 (62.5%)	2 (12.5%)	<0.001
Moderately improved	4 (25%)	5 (31.3%)	0.71
Slightly improved	2 (12.5%)	6 (37.5%)	0.08
No change / worsened	0	3 (18.8%)	0.04

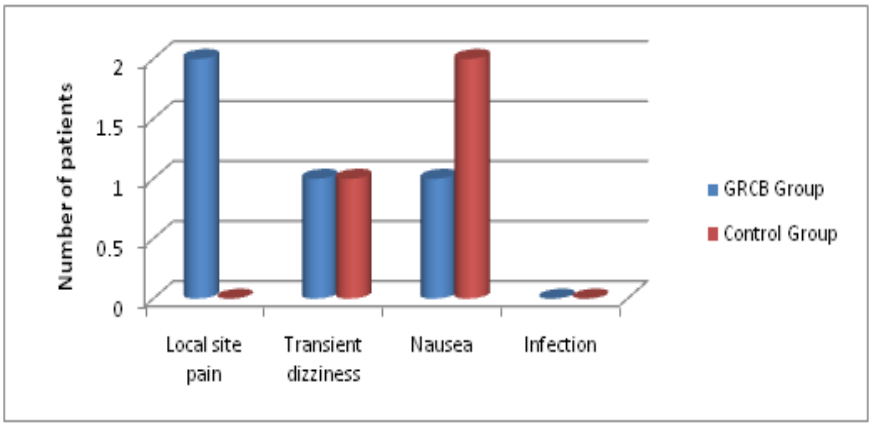

Figure 1: Adverse Events

In our study both groups were comparable at baseline with no statistically significant differences in demographic or clinical parameters. The mean age was 51.3 ± 8.5 years in the GRCB group and 49.6 ± 7.9 years in the control group (p = 0.58). The male-to-female ratio was similar (9:7 vs. 8:8; p = 0.73). Mean BMI was 26.9 ± 3.4 kg/m² in the GRCB group and 27.1 ± 3.7 kg/m² in controls (p = 0.89). Duration of pain, baseline Visual Analogue Scale (VAS), and Oswestry Disability Index (ODI) scores were also comparable between groups (p > 0.05). At baseline, mean VAS scores were comparable between the GRCB group and control group (7.7 ± 0.9 vs. 7.6 ± 1.0; p = 0.74). However, following intervention, the GRCB group demonstrated a significantly greater reduction in pain scores at all subsequent time points. Mean VAS scores at 1 hour, 24 hours, 1 week, 4 weeks, and 8 weeks were markedly lower in the GRCB group compared to controls (p < 0.001 at all intervals). At baseline, mean ODI scores were comparable between the GRCB and control groups (53.4 ± 7.2 vs. 52.1 ± 7.6; p = 0.65). Following intervention, the GRCB group showed a significant and progressive improvement in functional disability compared to controls. At 1 week, 4 weeks, and 8 weeks, mean ODI scores were markedly lower in the GRCB group (38.2 ± 6.1, 33.5 ± 6.7, and 30.8 ± 6.9, respectively) than in the control group (48.5 ± 7.3, 46.2 ± 7.9, and 44.8 ± 7.4; p < 0.001 at all time points). At baseline, mean serum biomarker levels were comparable between the GRCB and control groups (1300 ± 230 vs. 1280 ± 210; p = 0.74). After treatment, the GRCB group demonstrated a significant reduction in biomarker levels compared to controls at all follow-up intervals. At 1 week, 4 weeks, and 8 weeks, mean values in the GRCB group were markedly lower (620 ± 200, 700 ± 210, and 760 ± 220, respectively) than those in the control group (1120 ± 250, 1050 ± 260, and 980 ± 240; p < 0.001, <0.001, and 0.002, respectively). At all post-intervention time points, the GRCB group demonstrated significantly higher mean scores compared to the control group. At 1 week, 4 weeks, and 8 weeks, the mean values in the GRCB group were 4.4 ± 0.6, 4.2 ± 0.7, and 4.1 ± 0.8, respectively, while in the control group they were 2.9 ± 0.7, 2.8 ± 0.8, and 2.6 ± 0.9 (p < 0.001 for all). Adverse events were generally mild and comparable between groups. Local site pain occurred in 2 patients (12.5%) in the GRCB group and none in the control group (p = 0.14). Transient dizziness was reported in one patient (6.3%) in each group (p = 1.00), while nausea occurred in 1 (6.3%) GRCB patient and 2 (12.5%) controls (p = 0.54). No cases of infection were observed in either group. The overall clinical outcome showed significantly better improvement in the GRCB group (n = 16) compared to the control group (n = 16). In the GRCB group, 10 patients (62.5%) were markedly improved, 4 (25%) were moderately improved, and 2 (12.5%) were slightly improved, with none showing no change or worsening. In contrast, in the control group, only 2 patients (12.5%) were markedly improved, 5 (31.3%) were moderately improved, 6 (37.5%) were slightly improved, and 3 (18.8%) showed no change or worsening. The difference in the proportion of markedly improved patients was highly significant (p < 0.001).

Discussion

We observed that both groups were comparable at baseline in terms of demographic and clinical characteristics, with no statistically significant differences in mean age (51.3 ± 8.5 vs 49.6 ± 7.9 years; p = 0.58), sex distribution (9:7 vs 8:8; p = 0.73), BMI (26.9 ± 3.4 vs 27.1 ± 3.7 kg/m²; p = 0.89), duration of pain (15.1 ± 4.6 vs 14.8 ± 4.3 months; p = 0.84), baseline VAS (7.7 ± 0.9 vs 7.6 ± 1.0; p = 0.74), and ODI (53.4 ± 7.2 vs 52.1 ± 7.6; p = 0.65). Following intervention, the GRCB group demonstrated significantly greater improvement than controls across all time points.

VAS scores declined markedly from 7.7 ± 0.9 at baseline to 3.5 ± 1.2 at 1 hour, 3.0 ± 1.1 at 24 hours, 3.4 ± 1.0 at 1 week, 3.9 ± 1.2 at 4 weeks, and 4.3 ± 1.4 at 8 weeks (p < 0.001), while ODI improved from 53.4 ± 7.2 to 30.8 ± 6.9 by 8 weeks compared with persistently higher values in controls (p < 0.001). Serum biomarker levels decreased substantially in the GRCB group (1300 ± 230 → 760 ± 220) compared with controls (1280 ± 210 → 980 ± 240; p < 0.001). Functional outcome scores were higher in the GRCB group (4.4 ± 0.6 vs 2.9 ± 0.7; p < 0.001). Adverse events were mild and comparable between groups (p > 0.05). Overall, 62.5% of GRCB patients showed marked improvement compared to 12.5% of controls (p < 0.001).In similar study by Rabieezadeh et al. (2024) reported a significant reduction in VAS and ODI following an eight-week dynamic neuromuscular stabilization exercise program in individuals with chronic low back pain [11].

Similarly, Bemani et al. (2023) demonstrated meaningful improvements in pain intensity (mean difference = −2.20, 95% CI −3.25 to −1.15) and disability following a multidimensional physiotherapy regimen [12]. Elawamy et al. (2018) found that erector spinae plane block provided effective analgesia in chronic low back pain compared with conventional pharmacologic therapy [13], while Tulgar et al. (2019) and De Cassai et al. (2021) similarly highlighted the efficacy and safety of ultrasound-guided erector spinae interventions for musculoskeletal pain [14,15]. More recently, Pourahmad et al. (2022) demonstrated that adding exercise-based

physiotherapy to pharmacotherapy significantly enhanced VAS and ODI outcomes [16].

Conclusion

We concluded that, the Gray Rami Communicantes Block (GRCB) has proven to be a highly effective treatment for persistent low back pain. Because both groups were similar at baseline, the evaluation was objective. At every follow-up point after the intervention, the GRCB group had a significant improvement in functional impairment, as indicated by ODI scores, and a marked reduction in pain intensity, as indicated by VAS scores, in comparison to controls.

In the GRCB group, serum biomarker levels also significantly dropped, suggesting a decrease in nociceptive activity. While adverse events were modest and similar across groups, functional and patient satisfaction levels were greater. Overall, a higher percentage of GRCB-treated patients showed noticeable clinical improvement. These results imply that GRCB is a well-tolerated, safe, and effective treatment for patients with persistent low back pain that relieves pain and restores function.

Reference

1. Hoy D, March L, Brooks P, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis. 2014;73(6):968-74.
2. Manchikanti L, Singh V, Pampati V, Damron KS, Barnhill RC, Beyer C, et al. Evaluation of the relative contributions of various structures in chronic low back pain. Pain Physician. 2001;4(4):308-16.
3. Suseki K, Takahashi Y, Takahashi K, Chiba T, Yamagata M, Moriya H. Sensory nerve fibres from lumbar intervertebral discs pass through rami communicantes: a possible pathway for discogenic low back pain. J Bone Joint Surg Br. 1998;80(4):737-42.
4. Park DY, Choi I, Kim TG, et al. Gray Ramus Communicans Nerve Block for Acute Pain Control in Vertebral Compression Fracture. Medicina (Kaunas). 2021;57(8):744.
5. [5] Tae HS, Kim SD, Park JY, Kim SH, Lim DJ, Suh JK. Gray Ramus Communicans Nerve Block: A Useful Therapeutic Adjuvant for Painful Osteoporotic Vertebral Compression Fracture. J Korean Neurosurg Soc. 2003;34:505-508.
6. Jang JS, Kwon HK, Lee JJ, Hwang SM, Lim SY. Rami communicans nerve block for the treatment of symptomatic Schmorl's nodes–A case report. Korean J Pain. 2010;23(4):262-265.
7. Elawamy A, Abdallah A, Abd-Elsalam K, et al. Erector spinae plane block in chronic low back pain: a randomized controlled study. Pain Physician. 2018;21(4):E319-E327.
8. Tulgar S, Ahiskalioglu A, De Cassai A, et al. Erector spinae plane block: a new era of regional analgesia for various pain syndromes. Clin Anat. 2019;32(8):1015-1023.
9. De Cassai A, Bonvicini D, Andreatta G, et al. Erector spinae plane block for low back pain: a prospective observational study. J Clin Anesth. 2021;72:110308.
10. Pourahmad S, Yazdani M, Karimi N, et al. Effectiveness of combined physiotherapy and pharmacotherapy in chronic non-specific low back pain: a randomized controlled trial. Clin Rehabil. 2022;36(9):1032-1041.
11. Rabieezadeh A, Mahdavinejad R, Sedehi M, et al. The effects of an 8-week dynamic neuromuscular stabilization exercise on pain, functional disability, and quality of life in individuals with non-specific chronic low back pain: a randomized clinical trial with a two-month follow-up study. BMC Sports Sci Med Rehabil. 2024;16:161.
12. Bemani S, Ghasemi S, Valentin S, et al. Effect of multidimensional physiotherapy on non-specific chronic low back pain: a randomised controlled trial. Adv Rheumatol (Lond). 2023;63:63.
13. Elawamy A, Abdallah A, Abd-Elsalam K, et al. Erector spinae plane block in chronic low back pain: a randomized controlled study. Pain Physician. 2018;21(4):E319-E327.
14. Tulgar S, Ahiskalioglu A, De Cassai A, et al. Erector spinae plane block: a new era of regional analgesia for various pain syndromes. Clin Anat. 2019;32(8):1015-1023.
15. De Cassai A, Bonvicini D, Andreatta G, et al. Erector spinae plane block for low back pain: a prospective observational study. J Clin Anesth. 2021;72:110308.
16. Pourahmad S, Yazdani M, Karimi N, et al. Effectiveness of combined physiotherapy and pharmacotherapy in chronic non-specific low back pain: a randomized controlled trial. Clin Rehabil. 2022;36(9):1032-1041.