ORIGINAL RESEARCH PAPER

Volume-7 | Issue-7 | July-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# EVALUATION OF LUMBAR FACET JOINT NERVE BLOCKS IN MANAGING CHRONIC LOW BACK PAIN: A TWO YEAR STUDY.

Anesthesiology

**Dr. Kanika** Senior Resident, Deptt. Of Anesthesia, PGIMS, Rohtak.

**Dr. Karan Siwach*** Senior resident, Deptt. Of Orthopedics, PGIMS, Rohtak.*Corresponding Author

**Dr. Aruna Yadav** Post graduate, Deptt. Of Anesthesia, PGIMS, Rohtak.

**Dr. Mayank Dutta** post graduate, MAMC Agroha.

**Dr. Aman Siwach** MBBS, PGIMS, Rohtak.

## ABSTRACT

**Objective:** To determine the clinical effectiveness of lumbar facet joint nerve blocks with or without steroids in managing chronic low back pain of facet joint origin.

**Methods:** The study included 120 patients with 60 patients in each group with local anesthetic alone or local anesthetic and steroids. The inclusion criteria was based upon a positive response to diagnostic controlled, comparative local anesthetic lumbar facet joint blocks. Outcome measures included the numeric rating scale (NRS), Oswestry Disability Index (ODI), opioid intake, and work status, at baseline, 3, 6, 12, 18, and 24 months. This is a randomized, double-blind, controlled trial.

**Results:** Significant improvement with significant pain relief of ≥ 50% and functional improvement of ≥ 40% were observed in 85% in Group 1, and 90% in Group II, at 2-year follow-up. The patients in the study experienced significant pain relief for 82 to 84 weeks of 104 weeks, requiring approximately 5 to 6 treatments with an average relief of 19 weeks per episode of treatment.

**Conclusions:** Therapeutic lumbar facet joint nerve blocks, with or without steroids, may provide a management option for chronic function-limiting low back pain of facet joint origin.

**Conflict of interest:** none.

## KEYWORDS

**Introduction:-**

Recent investigations (1) have reported the rising prevalence of chronic low back pain. Freburger et al (1) showed an increasing prevalence of chronic impairing low back pain over a 14-year interval from 3.9% in 1992 to 10.2% in 2006 – an overall increase in the prevalence of low back pain of 162% with an annual increase of 11.6%. The widely held belief that most of the episodes of low back pain will be short-lived, with 80% to 90% of these attacks resolving in about 6 weeks (2,3) has been questioned.(1,4-8)

Lumbar facet joints have been implicated as the source of chronic pain in 21% to 41% (with an overall prevalence of 31%) in a heterogenous population with chronic low back pain(9-18) utilizing controlled comparative local anesthetic blocks with 80% pain relief and the ability to perform previously painful movements as the criterion standard. Datta et al (9) established Level I or II-1 evidence for the diagnostic accuracy of controlled facet joint nerve blocks based on the United States Preventive Services Task Force (USPSTF) criteria (19). In addition, Rubinstein and van Tulder (20) concluded that there is strong evidence for the diagnostic accuracy of lumbar facet joint blocks in evaluating low back pain. Significant controversy surrounds the appropriate management of lumbar facet joint pain, with multiple therapeutic techniques established in managing chronic low back pain.9,10,21-23 The systematic review by Datta et al9 provided Level III (limited) evidence for lumbar intraarticular injections,24,25 Level II-1 evidence for lumbar facet joint nerve blocks,26-28 and Level II-2 evidence for lumbar radiofrequency neurotomy.29-31 The exact mechanism of the therapeutic effect of lumbar facet joint nerve blocks is not known, whereas radiofrequency neurotomy causes denaturing of the nerves. This report consists of the 2-year results of the comparativeness of lumbar facet joint nerve blocks with or without steroids evaluated in a randomized, double-blind, controlled trial in patients with a confirmed diagnosis of lumbar facet joint pain by means of comparative, controlled, local anesthetic blocks based on modified International Association for the Study of Pain (IASP) criteria, with 80% pain relief and ability to perform previously painful movements (9-11,32).

**Materials and Methods: -** The study was conducted at tertiary care Centre i.e. PGIMS, Rohtak. The study was performed based on Consolidated Standards of Reporting Trials (CONSORT) guidelines (33,34). 120 participants were assigned to one of the 2 groups consisting of either a non-steroid group (Group I) or a steroid group (Group II). Both groups were also divided into 2 categories each. Both groups received bupivacaine with or without steroid. Inclusion and Exclusion Criteria Inclusion criteria consisted of those patients with a history of chronic function-limiting low back pain of at least 6 months duration, 18 years of age, who were able to provide voluntary informed consent, willing to participate in the study as well as the follow-up, with positive results to controlled diagnostic lumbar facet joint nerve blocks with at least 80% concordant pain relief and the ability to perform previously painful movements. For diagnostic lumbar facet joint interventions the exclusion criteria included radicular pain, surgical interventions of the lumbar spine within the last 3 months, uncontrolled major depression or psychiatric disorders, heavy opioid usage (morphine equivalent of 300 mg), acute or uncontrolled medical illness, chronic severe conditions that could interfere with the interpretations of the outcome assessments, women who were pregnant or lactating, patients unable to be positioned in the prone position, and patients with a history of adverse reactions to local anesthetic or steroids.

**Diagnostic Lumbar Facet Joint Nerve Blocks: -**

All patients included in the study underwent controlled comparative local anesthetic blocks with 0.5 mL of 1% preservative-free lidocaine, followed by 0.5 mL of 0.25% bupivacaine on a separate occasion, usually 3 to 4 weeks after the first injection, if the results of the lidocaine block were positive. All of the procedures were performed in a sterile operating room, with intermittent fluoroscopic visualization, with intravenous access, and light sedation with midazolam being offered to all patients. A response was considered positive if there was 80% pain relief of at least 2 hours for lidocaine and 3 hours for bupivacaine and greater than the duration of relief with lidocaine, and the ability to perform multiple maneuvers which were painful prior to the diagnostic facet joint blocks. All other types of responses were considered negative; however, the diagnostic phase was not part of the study.

**Therapeutic Lumbar Facet Joint Nerve Blocks: -**

In the therapeutic phase, patients were treated with lumbar facet joint nerve blocks under fluoroscopy in a sterile operating room with the injection of a 0.5 to 1.5 mL mixture at each level as assigned by

grouping. Additional Interventions Patients were followed at 3-month intervals unless otherwise indicated and lumbar facet joint nerve blocks were repeated based on the response to the prior interventions with improvement in physical and functional status. Lumbar facet joint nerve blocks were repeated only when the reported pain levels deteriorated to below 50%, with initial report of significant pain relief of 50% or more after the previous block. The non-responsive patients receiving other types of treatments after stopping therapeutic lumbar facet joint nerve blocks were considered to be withdrawn from the study, and no subsequent data were collected.

**Objective: -**
The objective of this randomized, double-blind, controlled trial is to determine the clinical effectiveness of lumbar facet joint nerve blocks with local anesthetic with or without steroids in managing chronic low back pain of facet joint origin.

**Outcomes: -** Outcome measures included the numeric rating scale (NRS), Oswestry Disability Index 2.0 (ODI), employment status, and opioid intake, with assessment at 3, 6, 12, 18, and 24 months post-treatment. NRS represented 0 with no pain and 10 with the worst pain imaginable. The ODI was utilized for functional assessment. Value, validity, and frequent usage have been reported (33,35-42). Significant pain relief was described as a 50% or more reduction in the NRS score, and significant improvement in function was described as at least a 40% reduction in ODI. Opioid intake was evaluated based on the dosage frequency and schedule of the drug, with conversion of opioid intake into morphine equivalents (43). Patients unemployed or employed on a part-time basis with limited or no employment due to pain were classified as employable. Patients who chose not to work, were retired, or were homemakers (not working, but not due to pain) were not considered in the employment pool. Sample Size For this evaluation, a sample size of 60 patients for each group was chosen. There were no randomized trials available to base the calculation of sample size. Further, the sample size was much smaller in previous studies of lumbar (44) and cervical (45) medial branch neurotomies. The literature evaluating the quality of individual articles has shown a sample size of 50 patients in the smallest group as acceptable (46).

**Statistical Methods: -** Chi-squared statistic, Fisher's exact test, paired t-test, and one-way analysis of variance were used to analyze the data. Chi-squared statistic was used to test the differences in proportions. Fisher's exact test was used wherever the expected value was less than 5; a paired t-test was used to compare the pre- and post-treatment results of average pain scores and the ODI measurements at baseline versus 3, 6, 12, 18, and 24 months.

The t-test was performed for comparison of mean scores between groups. One-way analysis of variance was used for comparison of means among groups

**Results: -**
**Participant Flow: -** Figure 1 illustrates the participant flow.
**Recruitment: -** The recruitment period lasted from December 2015 to December 2017. Demographic characteristics are illustrated in Table 1. There were significant differences between Group I and II with respect to height with Group II patients taller than Group I patients. This is not expected to change the outcomes. The number of joints involved was as follows: 2 joints were involved in 70% of the patients and 3 joints were involved in 30% of the patients. Bilateral involvement was seen in 79% of the patients.

**Table 1**
**Demographic characteristics.**

| | | | |
|---|---|---|---|
| Gender | Male | **35% (21)** | **45% (27)** |
| | Female | **65% (39)** | **55% (33)** |
| Age | Mean ± SD | **48 ± 15** | **46 ± 17** |
| Height (inches) | Mean ± SD | **66 ± 3.8** | **68* ± 4.1** |
| Weight (pounds) | Mean ± SD | **183 ± 48** | **189 ± 50** |
| Duration of pain (months) | Mean ± SD | **108 ± 102** | **108 ± 94** |
| Mode of onset of pain | Gradual | **52% (31)** | **62% (37)** |
| | Sudden | **16% (10)** | **5% (3)** |
| | WC/MVA | **32% (19)** | **33% (20)** |
| H/O of previous lumbar surgery | | **20% (112)** | **13% (8)** |

Group I = bupivacaine
Group II = bupivacaine and steroids.
WC = Workers compensation
MVA = Motor vehicle injury

**Outcome: -**
Pain relief: - Numeric pain scale scores are illustrated in Table 3. There were significant changes in pain scores from baseline, at 3, 6, 12, 18, and 24 months in all the groups, with no differences among Groups I and II. At 2 years, the proportion of patients with significant pain relief was 85% and 90%, in Groups I and II respectively.

**Table 3**
Pain relief characteristics.

| | | | |
|---|---|---|---|
| Average Pain Scores (Mean ± SD) | Baseline | **8.2 ± 0.8** | **7.9 ± 1.0** |
| | 3 months | **3.8* ± 1.3** | **3.5* ± 1.1** |
| | 6 months | **3.6* ± 1.5** | **3.3* ± 0.8** |
| | 12 months | **3.7* ± 1.7** | **3.5* ± 1.1** |
| | 18 months | **3.5* ± 1.5** | **3.3* ± 1.0** |
| | 24 months | **3.5* ± 1.5** | **3.2* ± 0.9** |

* indicates significant difference with baseline values

Group I = bupivacaine.
Group II = bupivacaine and steroids.

Table 4 illustrates the therapeutic procedural characteristics with average weeks of pain relief per procedure over a period of 2 years.

**TABLE 4:**

| | | | | |
|---|---|---|---|---|
| One | **42 ± 47.1 (7)** | **42 ± 47.1 (7)** | **59 ± 51.7 (4)** | **59 ± 51.7 (4)** |
| Two | **39 ± 25.5 (4)** | **79 ± 51.0 (4)** | **29 ± 21.3 (6)** | **58 ± 42.6 (6)** |
| Three | **21 ± 12.6 (8)** | **63 ± 37.8 (8)** | **21 ± 10.9 (4)** | **63 ± 32.6 (4)** |
| Four | **18 ± 11.8 (2)** | **71 ± 47.4 (2)** | **18 ± 6.9 (8)** | **71 ± 27.7 (8)** |
| Five | **16 ± 5.8 (3)** | **81 ± 28.5 (3)** | **18 ± 2.9 (5)** | **89 ± 14.4 (5)** |
| Six | **13 ± 3.8 (5)** | **80 ± 20.3 (5)** | **15 ± 2.9 (5)** | **88 ± 17.6 (5)** |
| Seven | **13 ± 0.7 (10)** | **93 ± 4.8 (10)** | **13 ± 2.1 (6)** | **91 ± 14.5 (6)** |
| Eight | **13 ± 0.6 (18)** | **100 ± 5.1 (18)** | **12 ± 0.6 (20)** | **99 ± 4.8 (20)** |
| Nine | **11 ± 0.4 (3)** | **99 ± 3.8 (3)** | **11 ± 0.1 (2)** | **103 ± 0.7 (2)** |
| Average relief per procedure | **19 ± 19.9 (60)** | **82 ± 31.8 (60)** | **19 ± 18.2 (60)** | **84 ± 27.5 (60)** |

Functional assessment: -

**Table 5**
Functional assessment evaluated by Oswestry Disability Index scores (Mean ± SD).

| | | |
|---|---|---|
| Baseline | **26.6 ± 4.6** | **25.9 ± 5.0** |
| 3 months | **12.7* ± 4.7** | **13.5* ± 5.6** |
| 6 months | **12.7* ± 4.7** | **12.2* ± 5.0** |
| 12 months | **12.3* ± 4.8** | **12.0* ± 5.4** |
| 18 months | **12.1* ± 5.0** | **11.2* ± 4.9** |
| 24 months | **12.0* ± 4.9** | **11.0* ± 4.8** |

Table 5 illustrate functional assessment characteristics evaluated by ODI.

**Discussion: -**
This randomized, double-blind, controlled trial comprised 120 patients with chronic function-limiting low back pain of facet joint origin who were treated with therapeutic lumbar facet joint nerve blocks. Significant pain relief was shown in 85% of Group I and 90% of Group II at the end of the 2 year study period.

No significant differences were noted whether patients received treatment with local anesthetic only or local anesthetic and steroids. In addition, functional assessment as measured by ODI also showed significant improvement, with at least a 40% reduction in disability scores in 87% of patients in Group I and 88% of patients in Group II. Over the 2 year period, the average pain relief per procedure was 19 weeks; the average number of procedures was 5-6; total relief lasted 82 to 84 weeks. The results of employment status and opioid reduction were not significant. Pain relief and improvement in functional status were significant. Overall the results of the current study are similar to previous studies (26-28).

In this randomized, double-blind, controlled trial we found that the drug used in combination with local anesthetic i.e. steroid, did not

differ significantly in their response. The small differences between the 2 treatments are unlikely to be of clinical importance even in larger studies.

The basis for intraarticular injections has always been that inflammation is present, and that steroids should be used to treat the inflammation. However, with lumbar facet joint nerve blocks, no such claims have been made either about the presence or reduction of inflammation with the blockade. The present study shows equal effectiveness for local anesthetics with or without steroid, indicating a lack of support for the proposition of inflammation.

The literature is replete with descriptions of epidural corticosteroid injections providing a certain level of efficacy by their anti-inflammatory, immuno-suppressive, anti-edema effects, as well as the inhibition of neurotransmission within the C-fibers(48-50) At the same time, local anesthetics also have been described as providing long-term symptomatic relief, even though the mechanism of action including suppression of nociceptive discharge,(49) the blockade of the axonal transport, (51,52) the block of the sympathetic reflex arc and sensitization,(53,54) and anti-inflammatory effects (55).

The long-term effectiveness of local anesthetics has been shown in a host of previous studies as a result of local anesthetic nerve blocks or epidural injections (36,38-42,56). A review of the literature shows that the present study is the largest to evaluate the effectiveness of lumbar facet joint nerve blocks in a randomized controlled trial (though not placebo controlled) with a 2-year follow-up. The argument that the same drugs are used for diagnostic and therapeutic blocks has no relevance. This is similar to transforaminal epidural injections wherein the same local anesthetic is utilized for both diagnosis and therapy (57,58). In summary, the results present a real-world example describing patients in a private interventional pain management practice setting, with results generalizable to similar settings. However, the results are not applicable to the general population unless the same methodology is used for both diagnosis and therapy. The generalizability of the findings of this study might only be feasible if studies are published using large populations in multiple settings.

**Conclusion: -** The evidence in this report demonstrates lumbar facet joint pain diagnosed by controlled, comparative local anesthetic blocks may be treated with lumbar facet joint nerve blocks either with or without steroid.

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