SHORT REPORT

# Effects of decompression on pain, range of motion and function in patients with acute vs chronic lumbar radiculopathy

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## Abstract

The purpose of this study was to determine the effects of manual lumbar decompression on pain, range of motion, and function in patients with acute vs chronic lumbar radiculopathy. Thirty patients fulfilling the eligibility criteria at Tehsil Headquarter Civil Hospital Daska were randomly placed into three groups: acute group (n=10), chronic group (n=10), and control group (n=10). Mean age of the participants was 33.3±8.5 years and the mean body mass index was 25.0±4.4. There were 12 males and 21 female participants. Group A and Group B were 18 treated with decompression, lumbar mobilisation, hot packs, TENS and exercise therapy, while the patients in Group C were treated with lumbar mobilisation, hot packs and exercise therapy. Total duration of the treatment was four weeks at three sessions per week and the outcomes were measured at baseline and at the completion of four-week treatment with Visual Analogue Scale, Modified Oswestry Disability index, Straight Leg Raise, and Inclinometer. Data was analysed by using SPSS version 25. One Way ANOVA and Kruskal-Wallis Test were used to compare the means across the groups. It was concluded that manual lumbar decompression decreases pain, and increases range of motion and function in Group A (acute) as compared to Group B (chronic) and Group C (control).

**Keywords:** Radiculopathy, decompression, low back pain, visual analogue scale.

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## Introduction

Low Back Pain (LBP) is the leading cause of disability that is present worldwide.[1] It has a strong association with sedentary lifestyle, smoking, obesity and low socioeconomic status.[2] Lumbar radiculopathy is a condition in which pain occurs in the area of lower back and radiates to one or both lower limbs.[3] Low back pain radiculopathy also showed weakness, and paraesthesia due to impingement of nerve roots.[4] It is difficult to diagnose the level of nerve root compression by physical examination, so Magnetic Resonance Imaging (MRI) is used for the purpose.[5] Among the most common musculoskeletal conditions treated by physical therapists is the LBP. Physical therapist usually deal with LBP by lumbar traction.[6] Spinal decompression has been used for many years, although there is a lack of clinical evidence to support the efficacy of this treatment. It works on the same method as that of traction application. Manual lumbar decompression is a gentle form of manual lumbar traction that could reduce pain in the lumbar region. Manual lumbar traction is a safe method to treat patients with lumbar radiculopathy.[7]

In lumbar radiculopathy decompression was applied to reduce the radiculopathy. But very few studies are available on manual lumbar decompression intended to compare the effects of this technique on patients of acute vs chronic lumbar radiculopathy. So, the main purpose of this study was to ascertain the effectiveness of manual lumbar decompression in patients with acute vs chronic lumbar radiculopathy.

## Patients/Methods and Results

A total of 30 patients fulfilling the eligibility criteria at Tehsil Headquarter Civil Hospital Daska were randomly placed into three groups: acute group (n=10), chronic group (n=10), and control group (n=10) from July 20, 2020, to January 20, 2021. The sample size (30) was calculated using Open Epi calculator.[8] After approval from the ethical review committee of Riphah International University, Islamabad, Pakistan, patients were recruited using non-probability convenience sampling technique after obtaining permission from the hospital administration. The study was clinically registered by ClinicalTrials.gov ID: NCT04674917. Patients of acute and chronic radiculopathy along with a history of radicular pain that occurs on straight leg raise (SLR), age ranging from 18 to 50 years, of both genders were included. Patients with any systemic soft tissue, bony disease, spinal fracture, spinal tuberculosis, pregnancy, cancer, serious pathology, and red flags were excluded. Written informed consent was obtained from all patients. Blocked randomisation was done in which acute and chronic lumbar radiculopathy participants were allocated in acute and chronic blocks. Randomisation was done from two separate boxes, 15 cards for acute participants and 15 for chronic. Cards were numbered 1 and 2; 10 cards with number 1 and five cards with number 2 were placed in

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both the boxes. Patients who selected card with number 1 from box 1 were allocated in group A and number 2 in Group C; the same method applied with other chronic participants box, number 1 were placed in Group B and number 2 in Group C. Group A and B were treated with 30 seconds of manual lumbar traction, lumbar mobilisation (Grade I, II & III on L1 to L5), 120° F hot pack for 15 minutes, TENS (burst mode was used with burst rate 3Hz, pulse width was 250μs and frequency was 100Hz) for 10 minutes, and exercises which include back extension and ankle pump. Both the acute and chronic patients in group C were treated with lumbar mobilisation (Grade I, II & III), 120°F hot pack for 15 minutes, TENS for 10 minutes and exercises which include back extension and ankle pump. Data was collected through a self-structured proforma including demographics and outcome measures. Treatment duration was four weeks at three sessions per week and outcomes were measured at baseline and at the completion of four-week treatment. The duration of each session was 35 minutes. Data was analysed by using SPSS version 25. Normality was tested by using the Shapiro-Wilk test. Change within each group was measured by using Paired sample t-test for Modified Oswestry Disability Index (MODI), Straight Leg Raise (SLR), Inclinometer (parametric) and Wilcoxon Signed Rank Test for Visual Analogue Scale (VAS) (non-parametric). Difference between groups was measured by using One Way ANOVA for MODI, SLR, Inclinometer (parametric) and Kruskal-Wallis Test for VAS (non-parametric). The mean age of the participants was 24.9±3.92 years in Group A, 43.1±4.17 years in Group B, and 31.9±11.9 years in Group C. Both male and female participants were allocated in Group A, B and C. Six females and four males were included in group A, five females and five males were included in group B, and eight females and two males were included in group C. Mean BMI of Group A was 25.30±4.39, of Group B it was 24.60±3.21 and of Group C it was 25.30±3.63. Group A showed VAS, pre-median =3.00, IQR=0, post-median=1.00, IQR=0.5, Group B showed VAS, pre-median=3.00, IQR=1, post-median=3.00, IQR=2. Results shown in Table 1 and Table 2, describe across the group differences and within group comparisons, respectively. Group A showed significant improvement in the pain, range of motion and function as compared to Group B, while group C showed no significant results as compared to both A and B groups.

**Table-1:** One Way ANOVA (Post-Hoc test).

| Variables | I | J | I-J | S.E | Sig. | Confidence interval 95 % | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| **Modified Oswestry Disability Index** (Post) | A | B | -25.60 | 11.64 | 0.090 | -54.47 | 3.27 |
| | | C | -25.00 | 11.64 | 0.099 | -53.87 | 3.87 |
| | B | A | 25.60 | 11.64 | 0.090 | -3.27 | 54.47 |
| | | C | 0.60 | 11.64 | 0.999 | -28.27 | 29.47 |
| | C | A | 25.00 | 11.64 | 0.099 | -3.87 | 53.87 |
| | | B | -0.60 | 11.64 | 0.999 | -29.47 | 28.27 |
| **Straight Leg Raise** (Post-Treatment) | A | B | 15.90 | 11.19 | 0.345 | -11.85 | 43.65 |
| | | C | 19.60 | 11.19491 | 0.205 | -8.15 | 47.35 |
| | B | A | -15.90 | 11.19491 | 0.345 | -43.65 | 11.85 |
| | | C | 3.70 | 11.19491 | 0.942 | -24.05 | 31.45 |
| | C | A | -19.60 | 11.19491 | 0.205 | -47.35 | 8.15 |
| | | B | -3.70 | 11.19491 | 0.942 | -31.45 | 24.05 |
| **Spine flexion check with inclinometer** (Post-Treatment) | A | B | 3.00 | 1.46490 | 0.120 | -0.63 | 6.63 |
| | | C | 3.50 | 1.46490 | 0.061 | -0.13 | 7.13 |
| | B | A | -3.00 | 1.46490 | 0.120 | -6.63 | 0.63 |
| | | C | 0.50 | 1.46490 | 0.938 | -3.13 | 4.13 |
| | C | A | -3.50 | 1.46490 | 0.061 | -7.13 | 0.13 |
| | | B | -0.50 | 1.46490 | 0.938 | -4.13 | 3.13 |
| **Spine Extension** (Post-Treatment) | A | B | 3.60 | 1.55182 | 0.070 | -0.24 | 7.44 |
| | | C | 3.40 | 1.55182 | 0.091 | -.044 | 7.24 |
| | B | A | -3.60 | 1.55182 | 0.070 | -0.74 | 0.24 |
| | | C | -0.20 | 1.55182 | 0.991 | -4.04 | 3.64 |
| | C | A | -3.40 | 1.55182 | 0.091 | -7.24 | 0.44 |
| | | B | 0.20 | 1.55182 | 0.991 | -3.64 | 4.04 |

**Table-2:** Within Group Comparisons (Paired Sample t-test)

| | Groups | Pre | Post | Mean Diff | *p*-value |
|---|---|---|---|---|---|
| MODI | A | 82.4±10.4 | 27.0±25.3 | 55.4 | 0.000 |
| | B | 77.0±11.4 | 52.6±29.3 | 24.4 | 0.008 |
| | C | 67.8±16.1 | 52.0±22.9 | 15.8 | 0.002 |
| SLR | A | 48.2±13.3 | 88.9±24.0 | -40.7 | 0.000 |
| | B | 45.8±12.2 | 73.0±29.5 | -27.2 | 0.011 |
| | C | 52.4±11.2 | 69.3±20.6 | -16.9 | 0.009 |
| Spine Flexion | A | 44.2±2.29 | 50.4±2.75 | -6.20 | 0.000 |
| | B | 43.5±2.06 | 47.4±3.53 | -3.90 | 0.003 |
| | C | 44.4±2.06 | 46.9±3.47 | -2.50 | 0.005 |
| Spine extension | A | 24.2±2.29 | 30.3±4.49 | -6.10 | 0.000 |
| | B | 23.1±1.66 | 26.7±2.11 | -3.60 | 0.002 |
| | C | 24.3±2.31 | 26.9±3.38 | -2.60 | 0.008 |
| Spine Rotation (Rt) | A | 7.60±2.01 | 12.0±2.98 | -4.40 | 0.000 |
| | B | 6.30±2.00 | 9.60±2.54 | -3.30 | 0.002 |
| | C | 6.70±2.00 | 8.90±2.51 | -2.20 | 0.002 |
| Spine Rotation (Lt) | A | 7.50±2.06 | 12.1±2.33 | -4.60 | 0.000 |
| | B | 6.50±2.06 | 9.60±2.91 | -3.10 | 0.002 |
| | C | 6.90±1.91 | 9.10±1.52 | -2.20 | 0.004 |
| Lateral Spine Flexion (Rt) | A | 17.5±1.58 | 22.4±2.01 | -4.90 | 0.000 |
| | B | 16.6±1.42 | 19.8±2.29 | -3.20 | 0.001 |
| | C | 17.2±1.75 | 19.8±2.34 | -2.60 | 0.007 |
| Lateral Spine Flexion (Lt) | A | 18.1±1.20 | 22.1±1.91 | -4.00 | 0.000 |
| | B | 16.0±1.32 | 19.3±1.78 | -3.30 | 0.002 |
| | C | 17.0±1.52 | 19.0±1.43 | -2.03 | 0.006 |

MODI= Modified Oswestry Disability Index, SLR=Straight Leg Raising

## Discussion

The purpose of the study was to ascertain the effects of manual lumbar traction in acute and chronic lumbar radiculopathy; the study was based on four weeks' time duration. It was observed that lumbar decompression had clinically significant results as it decreased pain, increased

ROM and function in Group A which was the acute group as compared to Group B (chronic) and Group C (control). Group B had less significant effects as compared to group A while group C showed no significant effects. As lumbar radiculopathy is a major cause of LBP and many researches have been conducted and are available on the topic of decompression.[9,10] Spinal decompression showed positive effects in pain reduction. Decompression is effective in reducing pain in patients with lumbar disc prolapse. Spinal decompression was observed to relieve symptoms and restore mechanical function and increase range of motion. Spinal decompression reduces pain, stretches tight muscles and ligaments, and increases the disc height.[11] A study was conducted in 2017 to assess the effects of spinal decompression for lumbar region. Decompression was beneficial for the patients with low back pain and reduces disabilities by improving function. Long-term effects were possible with this method.[12] The current study observed that manual lumbar decompression, TENS, hot pack and exercise therapy (back extension) had significant effects in acute group ($p<0.05$), while the chronic and control groups showed no significant effects ($p > 0.05$).

## Conclusion

It is concluded that manual lumbar decompression decreased pain, increased range of motion and function in acute group as compared to chronic group and control group, while chronic group had less effect as compared to acute group and control group , and control group had no significant effect as compared to acute group and chronic group.

**Limitations:** Selection bias in this study was due to blocked randomisation. It was a single blinded study and conducted in one hospital only.

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**Conflict of interest:** None.

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