

Effects of Sciatic Nerve Mobilization on Pain, Disability and Range in Patients with Lumbar Radicular Pain

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ABSTRACT

Background: Lumbar radicular pain is one of the leading causes of musculoskeletal disability. Variety of conventional treatment options are available.

Aim: To find the effectiveness of sciatic nerve mobilization on disability and range of straight leg raise in patients with lumbar radicular pain.

Study Design: Randomized control trial.

Methodology: In this single blinded randomized control trial eighty patients were randomly divided in two groups. The experimental group received sciatic nerve mobilization along with routine physical therapy treatment whereas control group only received routine treatment in form of moist hot pack and back exercises. Outcomes were pain, disability and straight leg raise range measured through numeric pain rating scale, Modified Oswestry disability index MODI and inclinometer. The outcomes were assessed at baseline and at 4th and at 6th weeks of the treatment. Data was analyzed by SPSS software, version 20 as qualitative variables were expressed as mean \pm SD. Paired sample t-test was applied.

Results: Between groups analysis showed a significant difference in mean in both groups. Within group analysis was done using paired sample t test showed significant improvement ($p < 0.05$) occurred in all variables in terms of pain, disability and straight leg raise range but sciatic nerve group had better improvement in terms of pain and disability as compared to conventional group.

Conclusion: We concluded that sciatic nerve mobilization was an effective treatment for pain and disability in patients with lumbar radicular pain.

Keywords: Lumbar Radicular Pain, Lumbar Radiculopathy, Sciatic Nerve Mobilization and Sciatic Nerve Neurodynamics.

INTRODUCTION

Low back pain is one of the most common musculoskeletal problems that majority of people experience in their life once or more. Recurrent episodes of low back pain are one of the disabling factors in activities of daily living¹. The annual treatment cost for the back pain is increasing and every year it causes more disability and high treatment cost in American population². Low back pain may be categorized as mechanical, neurological, pathological and back pain of psychological origin. Neurogenic back pain is caused by dysfunction of either peripheral or central nervous system and it may or may not be radiating into buttocks and legs³. In 98% cases, disc herniation occurs at L4-L5 and L5-S1 segments with resultant radiating pain in lower back, buttocks and legs⁴. Lumbar radicular pain is defined as pain radiating to back and legs most commonly it is caused by disc herniation and resultant compression or irritation in lumbar and sacral nerve roots^{5,6}.

Some physical factors like heavy weight lifting, vibration, and postural stresses contribute towards disc degeneration, low back pain, and radiating nerve root symptoms besides repetitive task such as bending and twisting⁷. Work related risk factors have strong association with lumbar radicular pain that increases mechanical stresses on lumbar region⁸. Treatment interventions for patients with lumbar radicular pain range from conservative to surgical. Exercise therapy, spinal manipulation techniques and other methods aimed at gaining neuromuscular mobility are used for the treatment of lumbar radicular pain⁹. Neurodynamics is a set of maneuver used to assess and restore mobility and elasticity of the nervous system¹⁰. It is one of the approaches used in the treatment of neuropathic back pain. Neurodynamic techniques along with conservative management resulted in better outcomes in radiating or neuropathic pain¹¹. Neurodynamics lacked clinical implementation due to limited availability of diagnostic tools to

assess its efficacy. This study was conducted to find out effectiveness of sciatic nerve mobilization with conventional treatment in patients with lumbar radicular pain. This study helped future researchers to explore different aspects of this treatment.

The objective of the study was to find the effectiveness of sciatic nerve mobilization with conventional treatment in patients with lumbar radicular pain.

METHODOLOGY

This single blinded trial was retrospectively registered in Iranian registry of clinical trial and conducted according to the CONSORT guidelines. After ethical approval, the data was collected from outpatient physiotherapy department of a private hospital from (March 2017-October 2017). Consent was taken from each patient prior to data collection.

The sample size was calculated 80 subjects through epi-tool. Non probability purposive sampling was used to enroll the patients of both genders between ages 25 -55 years, unilateral radiating pain for more than two months and with positive Laseague test were included in the study. Patients with tuberculosis, inflammation around the tumors around the back, lumbar spine or with history of subluxation, fracture or spondylolisthesis were excluded from the study. After initial screening as per eligibility criteria, patients were equally divided in two groups through a computer generated random number table. 40 patients in experimental group (receiving sciatic nerve mobilization along with conventional treatment, 40 patients in control group (receiving only conventional treatment) out of which 3 patients were lost to follow up.

Intervention: The patients in sciatic nerve mobilization group A, were given routine physical therapy treatment according to North American spine society clinical guidelines. For Sciatic nerve mobilization (Group B), patients were given a comfortable supine lying position with pillow under head, hip and trunk in neutral position while maintaining knee extension throughout the maneuver. Participant's involved leg was passively raised to a point where he or she reported pain then ankle dorsiflexion was

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added by the therapist at that point to sensitize and confirm the painful point, range was noted using inclinometer. After that therapist lowered the symptomatic leg about 10° to 15° below painful point and added sciatic nerve gliding maneuver in the form of oscillatory movements at the ankle. 3 sets of 10 oscillatory movements at the ankle that were rhythmic ankle dorsiflexion and plantar flexion with a gap of 10 seconds between each set for 3 times a week for 2 weeks on alternate days.

Patients in Group-B, were treated with routine physical therapy treatment in the form of hot pack for 15 minutes, supervised back strengthening exercises and abdominal bracing exercises. Dose was on alternate days, 2 sets of 10 repetitions of each exercise thrice a week for 2 weeks. Straight leg raise range of motion was measured on affected side with inclinometer before the start of session and at the end of 6th session. Pain was measured using NPRS before and after the final session. MODI Questionnaire measured disability score before and after the treatment sessions. Outcome measures were assessed again after the end of 6th session. Straight leg raise was measured with inclinometer.

Statistical Analysis: Statistical analysis performed through SPSS 20. Paired sample t-test was used to compare pre and post treatment values within the group. Independent t-test was used to compare the difference in mean between the groups.

RESULTS

There were no significant differences between groups in the mean age, MODI, NPRS and SLR. For the neuro-mobilization group, the mean age, SLR, NPRS and MODI were 49.12 ±4.78, 4.30 ±1.43 and 20.22 ±5.62 respectively. The corresponding values for the routine physical therapy group for mean age, SLR, NPRS and MODI were 38.13±8, 46.05±5.50, 5.16±1.23 and 25.06±6.61 respectively as shown in table-1.

Table-1: Baseline Measurement

Baseline Measures	RPT Group (n=37)	SNM Group (n=40)	P-value
Age (years)	38.13±8.03	39.42±7.62	0.38
Gender Men/Women	3/4	¼	
SLR	46.05±5.50	49.12 ±4.78	0.56
NPRS	5.16±1.23	4.30 ±1.43	0.34
MODI	25.06±6.61	20.22 ±5.62	0.22

Patients' pain was improved in both groups however on the basis of paired t test it was found that patients' pain improved more in sciatic nerve mobilization group as compared to conventional one.

Table-3: Within Groups analysis for MODI, NPRS and SLR range

Outcome Measures	RPT group pre-treatment	RPT group Post treatment	P-value	SNM group Pretreatment	SNM Group Post Treatment	P-value
MODI	20.22±5.62	6.39±3.98	0.001	25.06±6.61	12.15±7.50	0.000*
NPRS	4.30±1.43	1.12±.99	0.006	5.16±1.23	2.02±1.36	0.001*
SLR	49.12±4.78	61.37±6.69	0.011	46.05±5.50	58.37±5.78	.040*

*Statistically Significant

DISCUSSION

This study investigated the effects of Sciatic nerve neuromobilization on pain, disability and SLR in lumbar radiculopathy. The results of the study showed that sciatic nerve mobilization improved pain, disability and SLR in experimental group as compared to the conventional group.

According to a study on comparison of active versus passive neuromobilization of sciatic nerve in lumbar radiculopathy it was found that NPRS score, SLR and ODI were improved in both groups¹². The patients in both groups were given lumbar traction prior to neuromobilization so it is unclear that the improvement in pain and disability was due to neuromobilization or lumbar traction. The results of this study are in accordance with our results which showed that sciatic nerve mobilization improved pain and reduced disability in patients with lumbar radiculopathy.

Paired sample statistics regarding score of numeric rating pain scale, for routine physical therapy group showed a mean of 3.175, standard deviation ± 1.278, p value 0.000. For Straight leg raise range the mean and standard deviation were 1.22 ± 5.18 with a p value 0.000, and for Modified Oswestry Disability Index the mean and standard deviation were 1.38±3.75 with a p value 0.000.

For sciatic nerve mobilization group the mean score and standard deviation for numeric pain rating scale was 3.135, ±1.377, p value 0.000, for Straight leg raise range the mean and standard deviation were 1.23±5.88 with a p value 0.000 and for Modified Oswestry Disability Index the mean and standard deviation were 1.29±0.52 with a p-value 0.000* (Table-2).

Table-2: Between group analysis for MODI, NPRS and SLR range within groups

Outcome Measures	RPT Group Mean± SD	SNM Group Mean ±SD	P-value
MODI	1.38±3.75	1.29±0.52	0.000*
NPRS	3.17±1.27	3.13±1.37	0.000*
SLR	1.22±5.18	1.23±5.88	0.000*

*Statistically Significant

Inter group comparison of disability using MODI using independent t test assuming equal variances before treatment found significant difference with p value 0.001 with a difference of means-4.844. Comparison of means at post interventional level of assessment, using independent samples T test showed that assuming equal variances mean there found significant difference p value 0.000 with a difference of means to be -5.769.

Intergroup comparison of pretreatment pain status assuming equal variances showed significance level to be p value 0.006 with a difference of means to be -0.8621, while degree of freedom was 75 found to have significant difference. However post treatment pain comparison using independent t test assuming equal variances showed significance level of p value 0.001 with a difference of means to be -0.90203, while degree of freedom was 75.

Comparison of means of straight leg raise range of motion at pre interventional level of assessment, using independent samples T test showed that assuming equal variances mean there found significant difference p value 0.011 with a difference of means 3.0709. Comparison of means at post interventional level of assessment, using independent samples T test showed that assuming equal variances mean there found significant difference p value 0.040 with a difference of means 2.996. Straight leg raise range improved markedly in both groups as shown in table-3.

In a study on post-surgical patients of lumbar menisectomy it was concluded that there is no difference in the experimental group and treatment group in terms of pain, disability and quality of life¹³. In contrast to these results our study showed that inspite of improvement in all variables in both groups there was more improvement in neuromobilization group as compared to conventional group.

In another study it was demonstrated that sciatic nerve passive mobilization results in greater improvement in outcomes such as pain and disability as compared to conventional treatment alone¹⁴. The sample size in this study was very small and only 12 patients were recruited in the treatment group. The study emphasized the use of PSLR in acute stage of lumbar radiculopathy, however in our study patients suffering from

lumbar radiculopathy for more than three months responded equally well to the neuromobilization.

A study was conducted by Haris Èolakoviæ, et al demonstrated that patients who received neural mobilization and lumbar stabilization exercises responded better on visual analogue scale and straight leg raise scores. Hence neural mobilization along with conservative treatment results in better patient outcomes as compare to conservative management alone¹⁵. It was a four week mobilization program conducted on thirty patients but it is not clear that pain and disability improvement was solely due to neuromobilization or lumbar stabilization exercises have also played their role.

Similar findings were found in a study proposed by Meena Gupta suggested that when conventional treatment was added with neurodynamics resulted in reduction of short term disability, improvement in function and reduction in pain associated with sciatica¹⁶.

According to study conducted by Anikwe EE1 et al demonstrated the Influence of Nerve Flossing Technique on acute sciatica and hip range of motion. The results of study revealed that flossing techniques with conventional treatment is more effective in reducing sciatic pain and improving hip range of motion^{17,18}.

A randomized clinical trial was carried out by Nisar et al to demonstrate the effectiveness of neural mobilization in lumbar disc herniation as it is considered as a contributing factor in radiating pain in back and legs. They compared Mulligans spinal mobilization with limb movement and neural tissue mobilization and concluded that neural tissue mobilization has better outcomes in terms of pain reduction, improving functional disability and centralization of symptoms¹⁹.

Limitations: The study has few limitations as well. The size of the sample was not enough to generalize the results over all patients. Limited resources were available. Only one joint was involved in this study however neurodynamics is applied at multiple joints with varying techniques reason of lumbar radicular pain was not specified in this study.

CONCLUSION

We concluded that that nerve mobilization group performed better than that of conventional group in terms of pain and disability score in patients with backache radiating to leg.

Authors' Contribution: **Z&SA:** Conceptualized the study, analyzed the data, and formulated the initial draft, **AA&WF:** Contributed to the histomorphological evaluation, **WP&NN:** Contributed to the analysis of data and proofread the draft

Conflict of Interest: None to declare

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