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Comparison of Spinal Mobilization with Leg Movement and Neurodynamic Sliding Technique for Improving Function in Radicular Leg Pain

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ABSTRACT

Background: Lumbar radiculopathy is characterized with pain in hip and lower back that goes down into leg through thigh. Mostly, it results from damage one or more spines of lower vertebrae from Lumber to Sacral. This damage may result in further compression of nerves exiting from vertebral foramina of these vertebrae

Objective: To compare effects of spinal mobilization with leg movement and neurodynamic sliding technique for improving function in radicular leg pain.

Methodology: This was randomized clinical trial conducted the department of Physiotherapy Fatimah Memorial Hospital, Lahore. 30 patients with symptoms of radicular leg pain were allocated to two treatment groups using their hospital record number. One group was treated with spinal mobilization with leg movement and the other group was managed with neurodynamic sliding techniques. Each patients was treated with two treatment session per week for two weeks. Outcome of the treatment was recoded on NPRS and ODI.

Results: There was significant difference across the two treatment group in terms of NPRS and ODI at post treatment week 1 and 2. The mean difference from the pretreatment value to final value at week II was 3.93 (P value < 0.05) in Spinal Mobilization with Leg Movement treatment group compared to 2.66 (P value < 0.05) in Neurodynamic Sliding treatment group. The mean difference from the pretreatment value to final value at week II was 33.80 (P value < 0.05) in Spinal Mobilization with Leg Movement treatment group compared to 27.40 (P value < 0.05) in Neurodynamic Sliding treatment group.

Conclusion: Spinal mobilization with leg movement is more effective than neurodynamic sliding technique for improving function in radicular leg pain.

Introduction

Low back pain is one of the common musculoskeletal complaints that is encountered by physical therapist in their clinical settings.[1] Low back pain has been termed as the primary cause of years lived with disability over past couple of years. The prevalence of low back in the general population varies from 15% to 54%.[2] One of the common symptom documented in patients with low back pain is pain radiation to the leg. Radicular leg pain is caused by lumbar disc herniation, with surgery and physical therapy as the main stay of the treatment.[3] The concept of neural mobilization was given by Butler which is actually set of techniques that are meant for the that is meant to restore the mobility of the nervous system.[4] Another author described neutral mobilization as a measure to reduce the tension on the nervous system which stimulates the normal physiological function of the neuron resulting in alleviation of symptoms.[5] Generally, it is evident that no signs of cauda equine syndrome are present in 60% of the lumbar radiculopathy, so conservative non-surgical treatment is most commonly advised for its management. A systematic review identified that most commonly used strategies used to

manage radicular leg pain was multimodal programs including the spinal mobilization, neurodynamics, exercises therapy and electrotherapeutic modalities. Neural mobilization has become increasingly popular in the management of radicular low back pain. A recent concept was also given by Mulligan of spinal mobilization with leg movement that involves the therapist applying the traverses pressure at the vertebrae while the patient attempts the leg movement in the direction of impaired movement.[6] Despite the evidence of effectiveness of spinal mobilization with leg movement, there are low quality studies comparing its effect with neurodynamic sliding

techniques in patients with radicular leg pain.[7] This study was designed to determine the effect of spinal mobilization with leg movement and neurodynamic sliding technique for improving function in radicular leg pain.

Methodology

This was randomized clinical trial conducted the department of Physiotherapy Fatimah Memorial Hospital, Lahore. A sample of 30 subjects with radicular leg pain was selected using Epitool based on the effect size of 1.01 form a previous study. Subjects were included in the study if their age was between 30-60 years of either gender, MRI findings of disc herniation (Grade 2 and above) at L4 to S1 level, pain greater than 4 on Numeric pain rating scale, disability greater than 10% on Oswestry Disability Index. Subjects with the metabolic disease of the spine, neurological deficit, history of facture at lumbar spine and physical therapy treatment in last 06 months were excluded. Selected patients were allocated into two groups using computer generated random number table. Group A was treated with Spinal mobilization with leg movement as described by Mulligan and Group B was treated with neurodynamic sliding technique. A consent form was signed by all the subjects participating in the study that explained the purpose of the study. Patients in both the two different groups were treated three days a week for four weeks. The outcome measure for possible improvement in pain and functional ability will be the Numeric Pain Rating Scale and Modified Oswestry Disability Index respectively. The collected data was entered into SPSS v 25 and analyzed. Within the group analysis and across the group analysis was performed using Repeated Measure ANOVA and Independent Sample T-test.

Results

The results of this study found that there was a significant difference across the two treatment groups in terms of NPRS and ODI at post treatment week 1 and 2 (Table I &

Table I: Across the group comparison of Pain in two treatment groups

Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
NPRS. PreTreat	Equal variances assumed	.971	.333	-.163	28	.871	-.06667	.40786
	Equal variances not assumed			-.163	27.684	.871	-.06667	.40786
NPRS.W1	Equal variances assumed	.906	.349	-2.695	28	.012	-1.40000	.51946
	Equal variances not assumed			-2.695	27.281	.012	-1.40000	.51946
NPRS.W2	Equal variances assumed	.837	.368	-4.000	28	.000	-1.33333	.33333
	Equal variances not assumed			-4.000	24.605	.001	-1.33333	.33333

Table II: Across the group comparison of ODI score in two treatment groups

Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
ODI.PreTreat	Equal variances assumed	.420	.522	1.410	28	.169	3.20000	2.26891
	Equal variances not assumed			1.410	27.897	.169	3.20000	2.26891
ODI.W1	Equal variances assumed	.228	.636	-2.265	28	.031	-4.33333	1.91303
	Equal variances not assumed			-2.265	27.546	.032	-4.33333	1.91303
ODI.W2	Equal variances assumed	1.151	.292	-3.280	28	.003	-3.20000	.97557
	Equal variances not assumed			-3.280	26.351	.003	-3.20000	.97557

II). The mean difference from the pretreatment value to final value at week II was 3.93 (P value < 0.05) in Spinal Mobilization with Leg Movement treatment group compared to 2.66 (P value < 0.05) in Neurodynamic Sliding treatment group (Table III & IV). The mean difference from the pretreatment value to a final value at week II was 33.80 (P value < 0.05) in Spinal Mobilization with Leg Movement treatment group compared to 27.40 (P value < 0.05) in Neurodynamic Sliding treatment group. Subjects treated with spinal mobilization with leg movement reported a greater positive change in their over health (disability and pain) as compared to subjects treated with neurodynamic sliding technique.

Discussion

A previous study compared the effect of neurodynamic stretching on subject with non-specific low back pain and concluded that its combination with conventional treatment (mobilization and exercise) has improved effects in terms of reduction in disability and improved lumbar range of motion than conventional treatment alone.[8] The finding of this study contradict the result of current study which states that spinal mobilization with leg movement being more effect than neural mobilization technique. Encroachment of the nerve root with the protruded disc exerts pressure of the nerve root. This compression caused mild conduction block and axonal loss across the distribution of nerve. The symptoms will disappear when the nerve root compression is relived. Thus neurodynamic technique performed on subject with radicular pain reduces the symptoms by improving the mobility of nerve, axoplasmic and vascular flow in the nerve.[9]

Table III: Within the group comparison of NPRS score in two treatment groups

Pairwise Comparisons							
Measure: 1							
Study Group	(I) NPRS	(J) NPRS	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Spinal Mobilization with Leg Movement	1	2	2.733*	.300	.000	1.917	3.549
		3	3.933*	.358	.000	2.960	4.907
	2	1	-2.733*	.300	.000	-3.549	-1.917
		3	1.200*	.368	.017	.201	2.199
	3	1	-3.933*	.358	.000	-4.907	-2.960
		2	-1.200*	.368	.017	-2.199	-.201
Neurodynamic Sliding	1	2	1.400*	.515	.050	.002	2.798
		3	2.667*	.333	.000	1.761	3.573
	2	1	-1.400*	.515	.050	-2.798	-.002
		3	1.267	.511	.080	-.123	2.657
	3	1	-2.667*	.333	.000	-3.573	-1.761
		2	-1.267	.511	.080	-2.657	.123

Table IV: Within the group comparison of ODI score in two treatment groups

Pairwise Comparisons							
Measure: 1							
Study Group	(I) ODI	(J) ODI	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Spinal Mobilization with Leg Movement	1	2	19.933*	1.669	.000	15.398	24.469
		3	33.800*	1.506	.000	29.707	37.893
	2	1	-19.933*	1.669	.000	-24.469	-15.398
		3	13.867*	1.199	.000	10.609	17.124
	3	1	-33.800*	1.506	.000	-37.893	-29.707
		2	-13.867*	1.199	.000	-17.124	-10.609
Neurodynamic Sliding	1	2	12.400*	1.417	.000	8.549	16.251
		3	27.400*	2.265	.000	21.244	33.556
	2	1	-12.400*	1.417	.000	-16.251	-8.549
		3	15.000*	1.721	.000	10.323	19.677
	3	1	-27.400*	2.265	.000	-33.556	-21.244
		2	-15.000*	1.721	.000	-19.677	-10.323

Another study conducted on the subjects with sub-acute sciatica used nerve flossing technique for six consecutive days. The other group received combination of flossing technique with electrotherapeutic modalities and found it to be more effective than the previous one. [10] Barker et al[11] found significant positive correlations between unilateral atrophy of multifidus and psoas muscles of the affected side with pain rating, duration of symptoms, and reported degree of nerve compression. The LBP patients in this study were severely affected, with average visual analog score (VAS) score of 7.4 (0 – 10 scale), and Oswestry Disability Index (ODI) of 38.4%, which are more severely affected than those included in the study by Ploumis et al, with an average VAS of 5.3 and ODI of 25.2%. A similar magnetic resonance 13 imaging study by Hartvigsen et al[12] examined multifidus CSA in LBP patients with radiculopathy and those with intervertebral disc herniation but no radiculopathy, and compared fat-free CSA of multifidus between unaffected and affected sides (or between the right and left side in the control group). They determined that multifidus atrophy, defined as a statistically significant difference between sides, was apparent in 78.6% of radiculopathy patients, but only 24% of the disc herniation without radiculopathy group and 10% in the control group.

Multifidus atrophy, measured with magnetic resonance imaging in 90 chronic nonspecific LBP patients, was correlated with leg pain rating, but not with the presence of disc herniation, radiculopathy symptoms, or a number of herniated discs. Atrophy in the multifidus, but not in ES or psoas was found in chronic low back pain patients using computed tomography imaging by Danneels et al.[13]

Conclusion

Hence the results of this study conclude that spinal mobilization with leg movement is more effective than neurodynamic sliding technique for improving function in radicular leg pain

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