

COMPARISON OF SPINAL MOBILIZATION WITH LEG MOVEMENT VERSUS MCKENZIE BACK EXTENSION EXERCISES IN LUMBAR RADICULOPATHY FOR LUMBER RANGE OF MOTION

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ABSTRACT

Background: Radiating pain along with some sensory and motor deficits in lower back and hip into the leg are the characteristics of Lumbar Radiculopathy. The effective treatment and management of the symptoms associated with Radiculopathy are manual therapy techniques like Spinal mobilization with leg movement and McKenzie Extension exercise.

Aim: The aim of present study was to compare the effects of Spinal mobilization with leg Movement to the McKenzie Extension exercise to manage the Lumbar Radiculopathy.

Methods: It was Randomized Control Trial which included 60 patients of age 28-50 years with Lumbar radiculopathy which were grouped into two by sealed envelope method ;the first group (A) was Experimental Group, while the other group (B) was the control Group and were selected from City hospital Multan from February 2018 to June 2018. The participants of the study were requested to complete the protocol for 4 weeks (3 days per week, 30 repetitions in one session). Participants were examined before and after the tests, for pain intensity (NPRS), functional Mobility measured by MODI and range of motion by goniometry.

Results: A significant decrease in pain intensity on NPRS ($P < 0.05$) and MODI Scoring ($P < 0.05$) with noticeable improvement in Functions and range of motion measured by Goniometry was observed. (Readings were taken at 1st session and at the end of the completion of the session). Study results showed an equal reduction in pain in both groups while improvement in MODI scoring and Range of motion was more significant in experimental group (A) with respect to the control group (B).

Conclusion: It was observed by the study results that SMWLM is found to be more effective in improving the range of motion while both techniques SMWLW and McKenzie Extension Exercises were effective in improving the pain control, decreasing the severity and MODI Scoring.

Key Words: Lumbar Radiculopathy, Spinal mobilization with leg movement, McKenzie Extension Exercises. Numeric Pain Rating Scale: Modified Oswestry Disability Index.

INTRODUCTION

The sum total composite of symptoms which occur from Nerve root involvement characterized by sensory and motor deficits defines radiculopathy. Radiculopathy is dissenting from nerve root pathology or radicular pain". Both radiculopathy and radicular pain may found together, for sure patients may have radiculopathy without pain, on the other hand radicular pain can found without radiculopathy. Radicular pain or nerve root pain associated with the single symptoms i.e. pain which is caused by one or more spinal nerve roots involvement. Lumbar radiculopathy accompanied by multiple symptoms may involve the spinal nerve roots from L1 to S1^{1,2}

Prevalence of lumbar radiculopathy is 4 to 6 percent among the common population, when compared with low backache. 6-11% of patients with low back pain also complain sciatica symptoms. Disc related sciatica in general population is probably at a rate of 4.4%.³

Socioeconomically causes also considered to give rise to the pathology known as lumbar radiculopathy. The frequency of disc pathology resulting in lumbar radiculopathy is 3%. 11.10% 11.10% of low back pain is observed in working population while 13% owing to lumbar radiculopathy. 10% to 26%, is the incidence of lumbosacral radiculopathy sited however in most of the cases pain and interrelated symptoms resolves after two weeks approximately while at the same time a considerable group (35%) remains with pain for a year or more than a year.⁴

The impingement of peripheral nerves is the main cause of lumbar Radiculopathy that comes out from the intervertebral foramina due degenerative changes (osteophyte formation) or by the disc prolapsed resulting

in pain with or without sever neurological symptoms (e.g numbness, paresthesia, reflex abnormality and motor weakness).^{3, 5} If we talk about age patients with the age lower than fifty year, a prolapsed disc is the most usual cause whereas after the age of fifty years; radiculopathy is mainly caused by osteoarthritic changes related to age in the spine (stenosis of the foramen intervertebral).^{6,7}

Activities that put an undue and extreme repetitive load on the spine are considered as predisposing factors for radiculopathy. Population occupied in heavy work or contact sports are at high risk to develop radiculopathy as compared to those with a more sedentary lifestyle.⁸

Secondary Risk factors for acute lumbar radiculopathy are (peak 40-60 years) smoking, mental strain, lengthy physical activity (regular lifting) and driving (shaking of whole body).⁹

Conventional or a surgical mode of treatment may be applied to treat lumbar radiculopathy. According to the internationally accepted protocol conventional management is prescribed for the first 6-8 weeks whereas Surgical procedures should be presented only if complaints stay longer for more than six weeks after a conventional management.¹⁶

Pain control is the main focus of conventional management and includes the use of pharmacological management by pain killers like NSAIDs, muscle relaxants and steroids while several other conventional treatments regimes including the physiotherapy exercises and manual therapy techniques. Most of the patient's response to conventional treatment.⁷ Surgery is recommended by the clinicians if patients don't response to conventional treatment.

Owing to the patient condition and disease pathology surgical procedures is applied.¹³ First line treatment is physical therapy that can have an advantageous effect. Effectiveness of both exercise therapy and manual therapy is obvious in recovery. Mild stretching and pain relief modalities are the main components of Physical therapy treatment protocol whereas improvement in flexibility and strengthening of neuromuscular and musculoskeletal system is addressed by conditioning exercise, ergonomic program, mobilization and manipulation.¹⁷

McKenzie Extension Exercises and Spinal Mobilization with leg movement are the two manual therapy techniques and briefly discussed as these two different regimes were compared in the study to treat the lumbar radiculopathy. In the patients suffering from low back pain cause by any musculoskeletal or neuromuscular derangements, for pain management McKenzie extension exercises are effective.¹⁸ Symptoms which depends upon the pathology that whether it is flexion biased or extension biased three main and basic principles of McKenzie used clinically for treatment. Extension principle are applied to treat flexion biased whereas extension biased treated with flexion principle.¹⁹

Lumbar radiculopathy and correction of kyphotic Antalgic posture are treated with McKenzie extension exercises. These exercises are performed as we ask the subject to lie on the stomach, then putting the weight on elbow and further progressed the weight bearing on hands.²⁰

Brian Mulligan developed a manual therapy technique to treat the spinal pathology arising by mechanical restriction causing the Lumbar radiculopathy, SMWLM technique

performed in side lying, with the affected leg upmost; patient lies facing towards the therapist with an assistant therapist supporting the patient's affected leg. Therapist flexes over patient and placed one thumb reinforced over other on the spinous process of the chosen vertebra as palpated with orientation to posterior superior iliac spine. The therapist then applies the pressure on chosen spinous process. The pressure is maintained and the patient actively performs the offending movement for the leg supported by the assistant provided.²¹ The current study compare the effects of Spinal mobilization with leg Movement with McKenzie Extension exercise to manage the Lumbar Radiculopathy.

METHODOLGY

An RCT (Randomized Control Trial) was done at the department of physical therapy, City Hospital Multan. The effectiveness of Spinal Mobilization with leg movement versus McKenzie Extension exercises was evaluated from February 2018 to July 2018. A sample of 66 patients participated and two groups were made, each having 33 patients. Inclusion and exclusion criteria was considered to select the sample size, i.e. Age b/w 28-50 years, clinically diagnosed patient with Lumbar radiculopathy and both male and females were included in the study while exclusion criteria included, Fracture, Trauma Inflammatory disorder Acute disc bulge ,Lumbar instability , scoliosis , Patient with RA and other systemic diseases. After selecting patients according to inclusion and exclusion criteria, two groups were made, A and B by sealed envelope method. Both groups received routine physiotherapy interventions along with specific interventions. Treatment protocol for group A was conventional Treatment (Application of Hot pack for 10min.) along with Specific Treatment-Spinal Mobilization with Leg Movement and for group B was

Conventional Treatment (Application of Hot pack for 10min.) accompanied by Specific Treatment- McKenzie Extension Exercises. Interventional group (Group A) treated with SMWLM performed in side lying, patient facing the physiotherapist while the leg movement may assist by another person (Physiotherapist/assistant). Sustained transverse glide is given on the desired spinous process with 10 repetition of offending movement in first session while 10 reps in each of 3 sets in further sessions. Three sessions per week and whole treatment was given for four weeks.

Control group (Group B) were treated by McKenzie Extension Exercises performed actively in prone position. Extension exercises performed in three stages, initially patient instructed to be just lift the neck and look on front at the eye level, then progressed next and weight bearing on the elbow by lifting up the shoulder and then moved on 3rd and final steps in which complete trunk extension is performed and weight bearing is on the hands, time frame was the same as for group A, the 10 reps in 1st session then 10 reps in each of 3 sets in further sessions and three sessions per week for four weeks.

RESULTS

Participants in both groups were male and female. Their mean age was 41.43 ± 6.426 for the experimental group while the mean age of Control group was 40.83 ± 6.36 . House wives were most affected population in both experimental and control group and its frequency was with 66% as displayed in

table 1 which showed the demographics of study participants.

Q-Q plots and Shapiro-Wilk tests were applied for normality of data distribution which showed that data is not normally distributed. Non parametric tests, like Wilcoxon Signed Rank Test, for comparison within the groups, and Mann Whitney Test, for comparison between the two (A &B) Groups, were applied to measure the pre and post Values of lumbar ranges, MODI and NPRS.

The difference of pre and post treatment results is showed in tables.

As the data was not normally distributed for NPRS, MODI and Lumbar ranges and normality test showed non- significant results at baseline so Mann Whitney Test was utilized for comparison between experimental and control group. Comparison between groups revealed that patients in Interventional group treated with SMWLM showed more improved in functional lumbar ranges as compared to control group while reduction in pain and improvement in MODI scoring was similar in both groups as shown in Table -2.

A significant improvement was depicted by Wilcoxon test for comparison within Group A in lumbar ranges, NPRS and MODI post test score with p value $< (0.05)(0.00)$ and Wilcoxon test for comparison within control group showed significant improvement in Lumbar ranges, NPRS and MODI post test score with p value $< (0.05)(0.00)$

Table 1: Demogarraphics (showing age with mean and standard deviation with Gender and profession of study participants)

Variable		Group A(Experimental)	Group B (Control)
		Mean \pm SD	Mean \pm SD
Age		41.43 \pm 6.426	40.83 \pm 6.36
		Frequency (percentage)	Frequency (percentage)
Gender	Male	6	8
	Female	24	22
Profession	Workers	10(33%)	10(33%)
	House Wife	20(66%)	20(66%)

Table 2: Mann Whitney Test applied between the Groups (Group A and Group B)

Variables		Group	IQ(IQ1-IQ3) Median	Mann Whitney Value	Z- Value	P- Value
NPRS	Pre	Experimental	2 (6)	353	-1.495	.135
		Control	1 (6)			
	Post	Experimental	2 (3)	430	-.304	.761
		Control	2 (3)			
MODI	Pre	Experimental	22 (49)	424	-.378	.705
		Control	19 (52)			
	Post	Experimental	15 (21)	332	-1.755	.079
		Control	18 (27)			
Lumbar Flexion	Pre	Experimental	8 (44)	333	-1.738	.082
		Control	10 (45)			
	Post	Experimental	3 (55)	253	-2.940	.003
		Control	10 (50)			
Lumbar Extension	Pre	Experimental	2 (14)	423	-.400	.690
		Control	3 (14)			
	Post	Experimental	2 (22)	112	-5.050	.001
		Control	3 (18)			
Lumbar Rt. Side Bending	Pre	Experimental	2 (14)	427	-.338	.735
		Control	3 (14)			
	Post	Experimental	4 (23)	92	-5.323	.001
		Control	4 (18)			
Lumbar Lt. Side Bending	Pre	Experimental	3 (14)	338	-1.671	.095
		Control	3 (13)			
	Post	Experimental	3 (22)	25	-6.315	.001
		Control	2 (16)			
Lumbar Rotation Rt.	Pre	Experimental	3 (10)	449	-.008	.994
		Control	3 (10)			
	Post	Experimental	2 (15)	139	-4.175	.001
		Control	3 (13)			
Lumbar Rotation Lt.	Pre	Experimental	2 (10)	367	-1.238	.216
		Control	3 (10)			
	Post	Experimental	2 (15)	135	-4.715	.001
		Control	2 (13)			

DISCUSSION

According to the results of present study, although the statistical results were insignificant as p value was > 0.05 (.761) of post NPRS and p value of post MODI was > 0.05 (.079) which means that both group showed improvements in pain intensity and functional scoring. So clinically both techniques were found effective in controlling pain and improving functional scoring. The statistical results of lumbar functional ranges (Flexion, extension, side bending and rotation) were significant as p value was < 0.05 , which means that experimental group showed the improvements which was treated by SMWLM. It means SMWLM is more effective in improving the lumbar region ranges when compared with McKenzie extension exercises.

Yadav et. al., also evaluate the effectiveness of SMWLM in patients suffering from Lumbar radiculopathy due to Disc herniation, they highlighted the same finding of significant decrease in pain with increase in functional mobility in both groups but Range of movement is or improved in experimental group treated with SMWLM. Result of this study supports the results of my study in aspect to reduction in pain intensity and improvement in ROM.²⁴

Another RCT was done in 2016 to compare the effects of SMWLM versus neural tissue mobilization in patients suffering from low back pain due to lumbosacral radiculopathy. For measuring the outcome, tools used were NPRS and MODI. The findings regarding both techniques were inferenced as effective in controlling the pain but SMWLM is more effective in improving the functional scoring, which was in favour of my study regarding improving the ROM in patients treated with SMWLM.^{22, 33}

Recent a meta-analysis was done by Pourahamdi et., al to analyse the effectiveness of SMWLM in managing the low back pain. Total 20 studies were included. Results of the studied were showing that Mulligan Technique is effective in controlling pain intensity but conclusion of the meta analysis explained that there is insufficient amount of evidence to conclude that Mulligan technique is effective to reduce the pain alone.⁽³⁴⁾

In 2014, Syra et. al., also conducted A randomized control trial (RCT) and evaluated the effectiveness of Mulligan SNAGs versus McKenzie EEP. A total of 37 patients were screened out as per inclusion criteria and randomly placed into two groups. Twenty patients in group A were treated with Mulligan SNAGs and 17 patients in group B with McKenzie EEP for four weeks at two session per week and single session per day. Visual Analogue Scale (VAS), Oswestry Disability Scale (ODI) and lumbar Range of Motion (ROM) were used as an assessment tools and were measured at baseline and at the completion 4 weeks intervention. At the completion of 4 weeks intervention the pre and post statistical analysis revealed that clinically the McKenzie EEP improved pain and disability slightly more than Mulligan SNAGs while the Mulligan SNAGs improved lumbar ROM more effectively than McKenzie EEP in all directions including flexion, extension, side bending and rotation. McKenzie EEP is clinically slightly more effective in the management of pain and disability as compared with Mulligan SNAGs, while Mulligan SNAGs are more effective in the improvement of lumbar ROM, hence the results of the study supported the result of my study regarding improving the Lumbar ROM of the group treated with SMWLM.³⁵

The efficacy of McKenzie extension exercises to manage the low back pain due Lumbar radiculopathy, was evaluated by several other studies. In 2018, shurti et., al also evaluated the effectiveness of McKenzie extension exercise, the results of the study supported McKenzie Techniques in treating the low back pain.³⁶

In 2015, a significant improvement in managing the Lumbar radiculopathy was observed in a prospective cohort study, which appraised the nonsurgical approach more effective to treat Lumbar radiculopathy, Non surgical approach was manual therapy techniques including McKenzie Extension exercises.³⁷

CONCLUSION

The results of the present study helped to conclude that lumbar range of motion is more effectively improved by Spinal Mobilization with Leg Movement. However both techniques are equally effective in patients for pain management and improving MODI function scoring in lumbar radiculopathy..

CONFLICT OF INTEREST

The authors declared no conflict of interest.

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