Comparison Of The Efficacy Of Low-Grade Mobilization Vs. Slump Neural Mobilization In Patients With Low Back Pain: A Randomized Controlled Trial

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Abstract- Low Back Pain (LBP) is a common health problem around the globe. However, there is a lack of evidence regarding the efficacy of mobilization techniques. Therefore, the purpose of this Randomized Controlled Trial (RCT) was to compare the efficacy of Low-Grade Mobilization (LGM) vs. Slump Neural Mobilization (SNM) in the management of pain and functional disability in LBP patients. A single-blinded, two arms, parallel-group design RCT was conducted on LBP patients. A total of 50 volunteers aged between 20 to 60 years of age, with a history of LBP and a positive slump test, were enrolled. Participants were randomly divided into two groups. Group A (25 patients) received LGM and group B received SNM. Both groups also performed core stability exercises. Treatment was provided 3 days per week for 30 minutes. The pain was assessed using the Numerical Pain Rating Scale (NPRS) and functional disability was assessed using the Modified Oswestry Low Back Pain Disability Index (MOLBPDI). Readings were taken pre and post two weeks intervention. Results revealed that before treatment, the NPRS in group A reported that 44% of participants have moderate pain and 44% had severe pain while after treatment 56% have no pain and 44% had mild pain. Group B reported that 24% have severe pain while after treatment 56% have no pain. However, the MOLBPDI post-test mean in group A was 16.36 and in group, B was 13.88 with a t-value of 1.223. No statistically significant difference was found between LGM and SNM at 95% CI ($p = \leq 0.05$). LGM and SNM both are significantly effective in reducing pain and functional disability in patients with LBP. However, no statistically significant difference was found between these two techniques.

Keywords: Low back pain, Maitland low-grade mobilization, slump neural mobilization, slump test.

I. INTRODUCTION

Low Back Pain (LBP) is globally considered one of the major reasons for years lived with disability worldwide.1,2 It is a common clinical and public health problem distressing general well-being, work performance, and Activities Of Daily Living (ADLs).3 Hence, affecting the economic conditions of individuals, their families, and the government.4

According to the results of the Global Burden of Diseases study in 2010 the global point prevalence of LBP is 9.4%. The latest study conducted in August 2021 by Liaqat et al., in Lahore, Pakistan found that 69.4% of automobile mechanics suffer from LBP.5 Furthermore; the study reported that around 70% of the population of industrialized countries experience LBP at some point in their lives.4

LBP can be described as persistent pain for at least 12 weeks in the lower part of the back.6 The commonest form of LBP is the non-specific or generalized which is not identified by any anatomical or pathological cause. Pain can arise from several sites, including the vertebral column, surrounding muscles, tendons, ligaments, and fascia. Stretching, tearing, or contusion of these tissues can occur after a sudden unexpected force applied to the spine from events such as heavy lifting and torsion of the spine. Whether muscle spasm is a significant etiology of lumbar spine pain, either as a cause or effect of a back injury, has not been proved.

The main aim of LBP management is to control the pain element, early return to work, and prevent disability.7, 8 The non-invasive and non- pharmacological treatment options have been reported effective for patients with LBP.9 Physical therapists routinely encounter patients

with LBP in their practice.8 In many physical therapy programs, mobilization techniques are an important part of the intervention. Mobilization techniques can be performed as physiologic movements or accessory movements.10, 11 Neural mobilization and spinal mobilization 8, 12,13 are one of the commonest forms of treatment techniques used by physical therapists.

The Slump test is a spinal test that is aimed at determining the relationship between the patient's symptoms and restriction of movement of the pain-sensitive structures within the vertebral canal or vertebra.8,14 It has been hypothesized that mobilization promotes adaptations of the nervous system with a decrease in the level of neural input from the painful site.15 Low-Grade Mobilization (LGM) is an effective technique of joint mobilization to reduce pain, recovery of mobility, and joint alignment.16 There are reportedly positive results of neural mobilization in the pain management and prevention of disability for people with LBP.17 Similarly, the Maitland technique has shown an increase in ROM and activity in patients with LBP.18

Many studies have been done to see the effects of these techniques in comparison with other techniques used in physical therapy practice 19,11 but to the best of our knowledge, there is no study done to compare the effects of LGM vs. Slum Neural Mobilization (SNM). Therefore, this Randomized Controlled Trial (RCT) aimed to:

- To compare the efficacy of LGM vs. SNM in the management of pain using the Numerical Pain Rating Scale (NPRS) in LBP patients after two weeks of intervention.
- To compare the efficacy of LGM vs. SNM in the management of functional disability using the Modified Oswestry Low Back Pain disability index (MOLBPDI) in LBP patients after two weeks of intervention.

II. METHODOLOGY

A single-blinded, two-arm, parallel-group design RCT was carried out on the patients suffering from LBP in the physiotherapy department of Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan. The study was completed from July to December 2022, after the approval of the synopsis. Participants who give written informed consent, aged from 20 to 60 years, with a history of LBP and a positive slump test were enrolled. However patients with the radicular sign, positive SLR test, congenital abnormality, infection or fracture of the spine, pregnancy-related postural changes, and history of back surgery or trauma were excluded from the study. Two outcome measures were used i.e. NPRS for assessing pain and the MOLBPDI was used to assess the functional disability due to LBP. Both tools establish good validity and reliability.

The sample size of 50 was calculated by using the online software OPEN EPI version 3. All the eligible voluntary LBP patients were divided into two groups via a simple random sampling technique. Participants were blinded through the sealed envelope method. Group A=25 and group B=25. Group A received LGM to the hypo-mobile segments identified during the initial examination. Patients were positioned prone. Posterior–anterior mobilization was provided to the most provocative vertebral segment for five bouts of 30-second oscillations (see figure 2). While Group B received SNM. The subject was positioned in long sitting, feet against a wall to maintain a neutral dorsiflexion angle, trunk flexed to enhance dural elongation, while the therapist applied cervical overpressure to ensure a consistent pressure just at the onset of symptom provocation. Five repetitions with a 30-second hold (see figure 1), coupled with this both the groups performed core stability exercises consisting of two sets of 10 repetitions of wall squats, bridges, pelvic tilts, quadruped arm, and leg lifts. Treatment was provided three times per week for 2 weeks resulting in six total treatment sessions. The outcome measures of NPRS and MOLBPDI was captured pre and post-3 weeks of intervention.

Figure 1: Application of LGM (Group A)

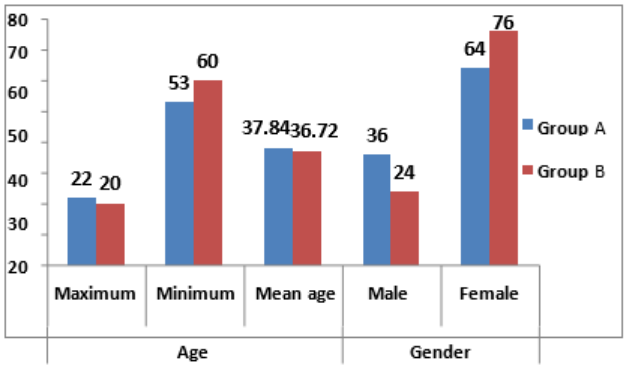
Figure 2: Application of SNM (Group B)

Data were stored and analyzed using IBM-SPSS version 23.0. Counts with percentages and mean were reported for baseline characteristics of studied samples. A paired sample t-test was used to compare the MOLBPDI before and after the treatment of LBP patients. P-values less than 0.05 were considered significant at 95% CI. NPRS score was reported and compared in percentages in both groups.

III. RESULT

In the present study, there were fifty participants divided into two groups one received LGM (group A), and the other received SNM (group B). The mean age of 37.84 was reported in group A while 36.72 was reported in group B. In group A, 36% were males and 64% were females while in group B 24% were males and 76% were female patients (see figure 3).

Figure 3: Baseline characteristics of study participants (50)



By comparing the pre-post findings both the groups shows significant improvement in pain. The NPRS in group A reported that 44% have moderate pain and 44% have severe pain while after treatment 56% have no pain and 44% have mild pain. Group B reported that 44% have moderate pain and 24% have severe pain while after treatment 56% have no pain and 44% have mild pain. No significant difference was observed in the post-post-treatment comparison in reducing pain (see table 1).

Table 1: Comparison of NPRS score among samples (n=50)

Variables		Group A		Group B	
		n	%	n	%
Pre-test NPRS	No pain	0	0%	0	0%
	Mild pain	3	12%	8	32%
	Moderate pain	11	44%	11	44%
	Severe pain	11	44%	6	24%
Post-test NPRS	No pain	14	56%	**14**	**56%**
	Mild pain	11	44%	**11**	**44%**
	Moderate pain	0	0%	0	0%
	Severe pain	0	0%	0	0%

The pretest mean in group A was 44.28±21.513 while the post-test mean was 16.36±8.995 with a t-value of 9.588. The decrease of 27.92 units was statistically significant with a p-value <0.01. Whereas the pre-test means in group B was 29.40±18.035 while the post-test mean was 13.88±7.876 with a t-value of 6.324. The decrease of 15.52 units was statistically significant with a p-value <0.01 (see table 2).

Table 2: Comparison of MOLBPDI score among groups A and B

Comparison of MOLBPDI score among group A					
Variables	**Mean**	**SD**	**MD**	**t-value**	**p-value**
Pre-test MOLBPDI	44.28	21.513	27.92	9.588	<0.01*
Post-test MOLBPDI	16.36	8.995			
Comparison of MOLBPDI score among group B					
Pre-testOLBPDI	29.40	18.035	15.52	6.324	<0.01*
Post-test OLBPDI	13.88	7.876			
*p<0.05 was considered significant using Paired Sample t-test					

The post-test mean functional disability score of group A was 16.36±8.995 and group B was 13.88±7.876 with a t-value of 1.223. The decrease of 2.48 units does not show a statistically significant difference between the groups with a p-value of 0.233 (See table 3).

Table 3: Comparison of post-MOLBPDI between Group A and B

Variables	**Mean**	**SD**	**MD**	**t-value**	**p-value**
Post-test MOLBPDI (Group A)	16.36	8.995	2.48	1.223	0.233
Post-test MOLBPDI (Group B)	13.88	7.876			
*p<0.05 was considered significant using Paired Sample t-test					

IV. DISCUSSION

The results of this study reveal that LGM and SNM both mobilization techniques are significantly beneficial in reducing LBP and functional disability. However, no statistically significant difference was found between the

two mobilization techniques.

The present study finding is in line with the study conducted by Mudassar Ali and his colleagues which claims that neural mobilization with conventional therapy is more effective than simple traditional treatment.20 Another study by Adel et al. added that the neural mobilization technique was effective in reducing pain, short-term disability, and centralizing the symptoms that cause dysfunction in the lumbar area.21

This result of our trial correlates with the previous study results in which slump stretching in combination with home exercises showed a positive impact on self-reported disability and pain factors.8

It is noteworthy that this trial found no statistically significant difference between LGM and SNM. In contrast, an experimental study conducted by Nagrale et al. claimed significant differences between and within the groups using slump stretching and lumbar mobilization in reducing non- radiating LBP, functional disability, and fear of avoiding activity due to pain.8

The current study is a significant contribution to addressing the gap area of the global health issue i.e. LPB and providing up-to-date evidence regarding the efficacy of mobilization techniques. Furthermore, outcome measures used in this study are standardized globally with high sensitivity and specificity.

There were some methodological limitations associated with this study. Firstly, the sample size was small. Secondly, the patients were not assessed as if they were taking any pain killer for the management of LBP which may have impacted the results. Thirdly, the duration of the study was short. Lastly, the Occupational activity levels of the patients were not recorded which may influence the results.

V. CONCLUSION

Results reveal that both the mobilization techniques i.e. LGM and SNM are significantly effective in reducing pain and functional disability in patients with LBP. However, no statistically significant difference was found between these two mobilization techniques. Future research examining longer- term follow-up periods, large sample sizes with expanded inclusion criteria, and dose-response of different mobilization techniques are recommended.

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