



# Effects of neural mobilization on pain, straight leg raise test and disability in patients with radicular low back pain

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## ABSTRACT

**Introduction:** Radicular low back pain is a disorder involving the dysfunction of the lumbosacral nerve roots. Clinical rehabilitation approaches for low back pain include kinesiotherapy, and physical therapy procedures: ice, rest, heat, ultrasound, TENS, but evidences regarding their effectiveness are lacking. The purpose of this study was to determine if nerve mobilization brings better improvements in pain, SLR test and functional disability in patients with radicular low back pain compared to standard physical therapy.

**Methods:** The study was conducted on a 60 patients with Radicular low back pain, treated in Regional medical center "Dr Safet Mujić", Mostar, during the period from 01.04.2010 until 31.04.2011. Patients were divided into two groups. First group (n=30) received a 4-week rehabilitation program including neural mobilization and lumbar stabilization program. Second group (n=30) received a 4-week rehabilitation program including active range of motion (ROM) exercises and lumbar stabilization program.

**Results:** At the beginning, the two groups were not significantly different in terms of score or SLR. After therapy there was statistically significant improvement between groups in both VAS scores [Group A:  $1.16 \pm 1.5$ ; Group B:  $2.25 \pm 2.2$ ] and SLR [Group A:  $80.9 \pm 17.4$ ; Group B:  $65.9 \pm 16.4$ ]. After the treatment, in group A, 46.6% (14) participants had been rated with 4, but in Group B: 33.3% (10) participants had been rated with 3.

**Conclusions:** Patients treated with neural mobilization and lumbar stabilization showed better VAS scores and Straight Leg Test scores compared to patients treated with active range of motion exercises and lumbar stabilization. Further research to investigate their long term efficacy is warranted, with emphasis on greater number of participants.

**Keywords:** Radicular low back pain, Neural mobilization, SLR test.

## INTRODUCTION

Low back pain (LBP) is normally of medically harmless character and most episodes (about 80%) end

within the first month. As a subgroup, radicular low back pain is a disorder involving the dysfunction of the lumbosacral nerve roots, with typical symptoms: radiating pain, often with numbness, paraesthesia, and/or muscle weakness (1). Today, back pain is a common problem and a recent systematic review concludes that low back pain continues to be a common problem at global level. With ageing popula-

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tion, the absolute number of people with LBP is likely to increase over the coming decades. According to the same review, the mean point prevalence was 18%, the one year prevalence was 38% and the mean lifetime prevalence was 39% (2). The annual prevalence in the general population, described as low back pain with leg pain traveling below the knee, varied from 9.9% to 25%.

LBP can have a biomechanical origin with nociception generating the pain. Various spinal structures such as paravertebral muscles, ligaments, facet joints, annulus fibrosus and spinal nerve roots have been suggested as the cause of pain. Other pain sources are disc herniation and spinal stenosis. It has been suggested that if nociceptive input continues over time it may result in functional, chemical and structural alterations in peripheral systems and at various levels within the central nervous system (3).

Clinical examination aims to clarify whether there is mechanical impingement of a nerve root. The most common clinical diagnostic tests are the Straight leg raise test (SLR), and tests for tendon reflexes, motor weakness, and sensory deficits (4).

A number of physical therapy interventions are used in the treatment of people with LBP (5). Treatment for LBP has been the subject of debate among clinicians and researchers. Studies evaluating the effectiveness of physical therapy interventions still remain sparse. Conservative treatment for LBP typically includes physical modalities (TENS, Ultrasound, Cryotherapy, Heat), kinesiotherapy (ROM exercises, strengthening) (6).

Neuromobilization is a set of techniques designed to restore plasticity of the nervous system, defined as the ability of nerve-surrounding structures to shift in relation to other such structures (7).

Neural mobilization was described by Maitland in 1985, Elvey in 1986 and Butler refined it in 1991 as an adjunct to assessment and treatment of neural pain syndromes including radicular low back pain. The goal of mobilization is to increase the flexibility of collagen that maintains the integrity of the nerve and movement of the nerve in relation to its surrounding structures.

Neural mobilization has a great role in management of radiculopathy and low back pain (8). The Straight Leg Raise (SLR) test is frequently used in the assessment of patients presenting with LBP. It has been

suggested that improving the range of SLR has a beneficial effect in restoring normal movement and reducing the degree of impairment due to low back dysfunction (9).

Unfortunately, there is not enough research evidence to support these conjectures. The aim of this study was to investigate the effect of neural mobilization on sciatic pain, SLR test and functional disability.

## METHODS

### Patients

Sixty patients, both male and female, with radicular low back pain were involved, age between 32 and 60 years. Study was conducted in the period from 01.04.2010. to 31.03.2011 in Regional medical center "Dr. Safet Mujić", Mostar. The patients were randomly allocated into two groups, Group A received neural mobilization and lumbar stabilization exercises and Group B received active range of motion (ROM) exercises for back and legs and lumbar stabilization exercises. Patients included into study were required to reproduce their symptoms with straight leg raise testing. VAS scale score and positive SLR test ( $< 45^\circ$ ) were recorded. Criteria for exclusion from the study were patients with metabolic diseases such as diabetes mellitus, patients with carcinoma in case history, patient leaving the follow up.

### Procedures

Group A was treated with neural mobilization in position on side with oscillatory movements: knee extension, hip flexion and ankle dorsiflexion. Mobilization procedures were repeated 3 times with 10 oscillatory movements for improving nerve gliding in intravertebral foramina. After relief of the symptoms, lumbar stabilization exercises according to Kabath were included.

Group B was treated with active ROM exercises for back and distal extremities, for improving range of motion in back and legs, and lumbar stabilization exercises according to Kabath.

Both groups had 4 week therapy program, three times per week.

Instruments used for verifying the improvements before and after therapy included: Visual analogue scale (VAS) scale, with scores 0 to 10 where 0 means

no pain and 10 means the strongest pain; Straight leg raise (SLR) test with goniometer, was performed according to the published instructions and the angle between the tibial crest and the horizontal plane was measured using a goniometer in (nonrounded) degrees (10).

After the therapy we used evaluation of the results of the clinical condition, according the following methodology: score 0 - unchanged condition (without treatment outcomes); score 2 - minimal improvement; score 3 - satisfactory functional improvement with consequences (sensory or motor); score 4 - good improvement and satisfactory functional restitution with minimal consequences; score 5 - good restitution without consequences of injury or illness, score 6 - quit the treatment; score 7 - further medical treatment required (diagnostic or operative) (11).

**RESULTS**

TABLE 1. Age characteristics of the sample

Variable	Group A	Group B
Age	42.3 (5.9)	43.1 (6.4)
Control	256 (85.3%)	44 (14.7%)

Both group A and group B were similar in terms of age: Group A: 42.3±6 yrs; Group B: 43.1±6.4 yrs.

TABLE 2. Gender characteristics of the sample

Groups	Sex		Total
	Female	Male	
Group A	19	11	30
Group B	14	16	30
Total	33 (55%)	27 (45%)	60 (100%)

Out of total 60 (100%), 33 (55%) participants were female, and 27 (45%) were male.

TABLE 3. Between-group change score before therapy

Variables	Group A	Group B
VAS scale	8.778 (0.86)	8.95 (0.85)
SLR testing with goniometer	36.877 (4.35)	37.28 (2.78)

At the beginning of study, the two groups were not significantly different in terms of VAS score: Group A: 8.77 ±0.86; Group B: 8.95 ±0.85 and SLR test measured with goniometer: Group A: 36.8±4.35; Group B: 37.2± 2.78.

TABLE 4. Between-group change score after therapy

Variables	Group A	Group B
VAS scale	1.166 (1.54)	2.25 (2.23)
SLR testing with goniometer	80.97 (17.44)	65.96 (16.43)

After therapy, there was statistically significant improvement between groups in both VAS scores (Group A: 1.16±1.54; Group B: 2.25±2.23, P<0001) and SLR test measured with goniometer (Group A: 80.9±17.4; Group B: 65.9±16.4, P<0001)

TABLE 5. Results of treatment

Assessment of treatment Results	Group A	Group B
0 - unchanged condition	0	0
2 - minimal improvement	2	0
3 - satisfactory improvement with outcomes of injury or illness	9	16
4 - good improvement and satisfactory functional restitution	14	10
5 - good functional restitution without sequels	5	4
6 - quit the treatment	0	0
7 - further medical treatment required (diagnostic or operative)	0	0
Total	30	30

After the treatment, in group A , 46.6% (14) participants had been rated with 4, but in Group B: 33.3% (10) participants had been rated with 3.

**DISCUSSION**

In this study, 60 participants were included. Out of total 60,33 (55%) participants were female, and 27 (45%) were male. The two groups were similar in terms of age [Group A: 42.3±6 yrs; Group B: 43.1±6.4 yrs].

Also, at the beginning of study, the two groups were not significantly different in terms of VAS score

[Group A: 8.7 ±0.86; Group B: 8.9 ±0.85] and SLR test measured with goniometer [Group A: 36.8±4.3; Group B: 37.2± 2.7]. After the therapy, there was statistically significant improvement between groups in both VAS scores [Group A: 1.16±1.5; Group B: 2.25±2.2] and SLR test measured with goniometer [Group A: 80.9±17.4; Group B: 65.9±16.4]. After the treatment, in group A, 46.6% (14) participants had been rated with 4, but in Group B: 33.3% (10) participants had been rated with 3.

Gurpreet K research confirms that SLR neural mobilisation is more effective than conventional therapy for improving pain and disability in patients with neurogenic pain syndrome (12).

Sahar also investigated efficacy of neural mobilization in treatment of low back dysfunctions in two groups. One group (A) had lumbar mobilization treatment with exercise therapy, another group (B) had SLR mobilization and lumbar stabilization. Group B was beneficial in improving pain, reducing short term disability and promoting centralization of symptoms (9).

Gupta also found out that Nerve mobilization techniques enhance patient outcomes in the management of sciatica when added to standard care (13).

The results of this study suggest that when neural mobilization is added to a treatment program of lumbar stabilization, significant improvement in radicular low back pain may occur. Both forms of statistical analysis revealed that both treatment groups had meaningful reductions in their ROM, pain and result of treatment, but group A, which included neural mobilization, improved significantly.

## CONCLUSION

Patients treated with neural mobilization and lumbar stabilization showed better VAS scores and Straight Leg Test scores compared to patients treated with active range of motion exercises and lumbar

stabilization. Further research to investigate their long term efficacy is warranted, with emphasis on greater number of participants.

## COMPETING INTERESTS

The authors declare no conflict of interest.

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