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Comparison of efficacy of straight leg raise with neural tissue mobilization and slump stretching on pain in patients with sciatica

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Abstract

Introduction: Sciatica is a set of symptoms including pain that caused by compression and irritation of one of five spinal nerve roots of the left or right or both sciatic nerves. The pain is felt in the lower back and radiates to buttock and lower limb. Numbness and muscular weakness can occur which leads to difficulty in moving or controlling the leg. Both the straight leg raise and slump stretching techniques have been used in the treatment of sciatica with distal symptoms. So the purpose of the study was to compare and to determine which among the two techniques was clinically more effective than the other. Also, it will add to the evidence for their effectiveness in managing symptoms in patients with sciatica.
Aim: The study aimed to compare the efficacy of straight leg raise with neural tissue mobilization and slump stretching on pain in patients with sciatica.
Methodology: 30 participants were divided into group A and B, 15 each group according to inclusion criteria using simple random sampling. Group A received straight leg raise with neural tissue mobilization and group B received slump stretching for 6 days. Both group participants received moist heat pack to hamstring for 10 minutes before applying the two techniques. The outcome measure was pain which was assessed at baseline and after 6 days of treatment protocol.
Result: Straight Leg Raise with Neural Tissue Mobilization proved to be more effective (mean 1.2, p value .001) than Slump Stretching in patients with Sciatica.
Conclusion: The present study showed that both techniques were useful in reducing pain in patients with sciatica but on inter group comparison we found that straight leg raise with neural tissue mobilization was more effective in reducing pain than Slump Stretching in patients with sciatica.
Keywords: Moist heat pack, Numerical Pain Rating Scale, Straight Leg Raise with Neural tissue Mobilization, Slump Stretching, Sciatica.

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1. Introduction

Sciatica is common type of radiculopathy. It is a non-specific term commonly used to describe symptoms of pain radiating to lower limb from the buttock over the posterior or lateral side of the lower limb and usually assumed to be caused by compression of nerve. The ancient Greeks used the term ‘sciatica’, to describe pains or ‘ischias’ felt around the thigh or hip. Hippocrates himself referred it to ‘ischiatic’ pain affecting men between 40 and 60yr [1].

Sciatica is also known by a range of terms, such as lumbosacral radicular syndrome, radiculopathy, nerve root pain and nerve root entrapment. Sciatic neuralgia is defined as ‘pain in the distribution of the sciatic nerve due to pathology of the nerve itself [2]. 40 percent of people at

some time experience sciatic pain and radiculopathy, which occurs, when sciatic nerve is trapped or inflamed. Prevalence of the symptoms of sciatica did not differ between males and females [3]. It was 5.1% for men and 3.7% for women aged 30 years or over [4]. It is occupation related also [5]. Physiotherapy treatment for sciatica primarily focuses on relief of pain. Butler recommends that neural mobilization be viewed as another form of manual therapy similar to joint mobilization [6]. Manual therapy methods should be used in order to re-establish the mechanical function of the impaired neural tissue (intra- and extra neural impairment) in the lumbar-pelvic lower limb complex. Sciatica is a set of symptoms including pain that caused by compression and irritation of one of five spinal nerve roots by compression or irritation of the left or right or both sciatic nerves. The pain is felt in the lower back and radiates to buttock and lower limb. In addition to pain, numbness and muscular weakness occurs which leads to difficulty in moving or controlling the leg. Straight leg raising test (SLR) is widely used one of the primary diagnostic physical examination tests in patients who have low back pain or low back and leg pain. Slump test is actually a variant of SLR [7]. These maneuvers and their variants have been used in the treatment of low back pain and lower limb radiculopathy where straight leg raise test and slump test were found to be positive in the physical assessment. Neural mobilization techniques are used in the instances of altered neurodynamics or altered neural tension. It aims to restore the relative mobility of the neural tissue and surrounding mechanical interfaces, reducing intrinsic pressures and regaining optimum physiological function [8].

Beneficial physiological effects have been reported as a consequence of neural mobilization techniques. Sciatica is the most common form of radiculopathy which is due to compression of the sciatic nerve root [9].Slump stretching is one of the physical therapy treatment used in treatment of sciatica. It causes improvements in disability, pain and centralization of symptoms [10]. So the purpose of the study was to investigate which among these two techniques were more effective in reducing pain in sciatica.

2. Methodology

An experimental design was chosen for this study. Ethical clearance was obtained from the Institutional Ethical Committee of Maharashtra Institute of Physiotherapy, Latur before recruiting the participants (Approval No: IEC/2020/UG-15/2020). Total 30 participants were recruited from the college OPD. Both males and females aged 18-60 years, clinically diagnosed as sciatica unilaterally were included in the study. Participants who had spinal surgeries, psychiatric illness, and pregnant women, infective or metabolic polyneuropathy and ankylosing spondylitis were excluded from the study. The aims, objectives and methodology of the study were explained to the participants in detail and written informed consent was obtained. The outcome measure assessed was pain by NPRS which is valid and reliable and extensively used for back pain (ICC = 0.95) [11]. The participants who were willing to participate were randomly divided into group A and group B of 15 participants each group by an independent collaborator by using a coin method.

Group A received Straight Leg Raise with Neural Tissue Mobilization [12] in which the participants were asked to be in supine lying position, with one pillow under the head. The trunk and pelvis were in neutral position. While the therapist was standing beside the affected side and raised the affected side perpendicular to the bed in standard straight leg raise test with one hand placed under the ankle joint and the other hand placed above the knee joints until either pain in the back or referred pain to the leg restricted the movement. Then the lower limb was taken down few degrees from this symptomatic point. The therapist mobilized the sciatic nerve by a sequence of gentle oscillations toward ankle dorsiflexion and then reassessed the effect. The group received 5 sets of 15 oscillations of neural tissue mobilization once a day for 6 days with one minute rest in between the sets. The amplitude of the technique was increased according to the participant response.

Group B received slump stretching [12] in which the participants were asked to sit in long sitting position with feet against the wall. The therapist applied overpressure in to cervical spine flexion and knee extension to the point where the patient's symptoms were reproduced. The position was held for 30 seconds. 3-5 stretches were performed in each session based on patient response. This technique was performed once a day for 6 days.

Both groups received moist heat therapy on posterior aspect of the thigh for 10 minutes before the application of techniques.

2.1 Statistical analysis

The data is analyzed using unpaired t-test and paired t-test. Descriptive statistical data was presented in the form of mean ± standard deviation and difference percentage were calculated and presented. Unpaired t test was performed to assess the statistical significant difference between the groups for the pain and active extension lag. Paired T test was performed to assess the statistical difference within the group for the pain and ROM and active extension lag. p-value < 0.05 were considered significant. Confidence interval was 95%.

Table1:Pre test Post test comparison of NPRS within Group A.

Pre testPost test comparison of NPRS within Group A.				
	Mean± SD	**T value**	**P Value**	**Inference**
PRE NPRS	6.86±1.06	24.39	0.0001	Significant
POST NPRS	1.20±0.56			

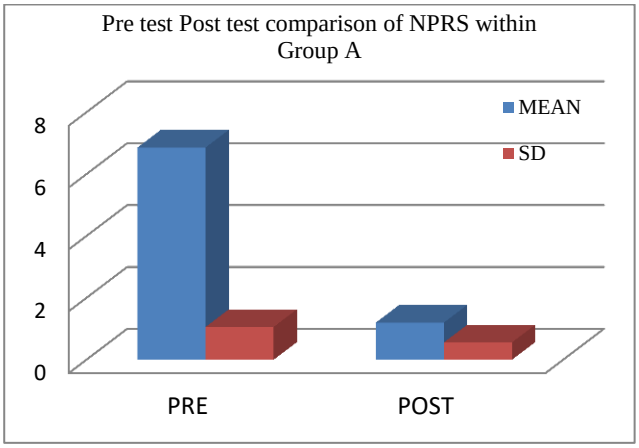

Figure 1:Pre test Post test comparison of NPRS within GroupA.

Table2:Pre test Post test comparison of NPRS within Group B.

Comparison between Group B NPRS Pre and Post test				
	Mean± SD	**T value**	**P Value**	**Inference**
PRE NPRS	7.06±1.22	13.9	0.0002	Significant
POST NPRS	2.2±0.67			

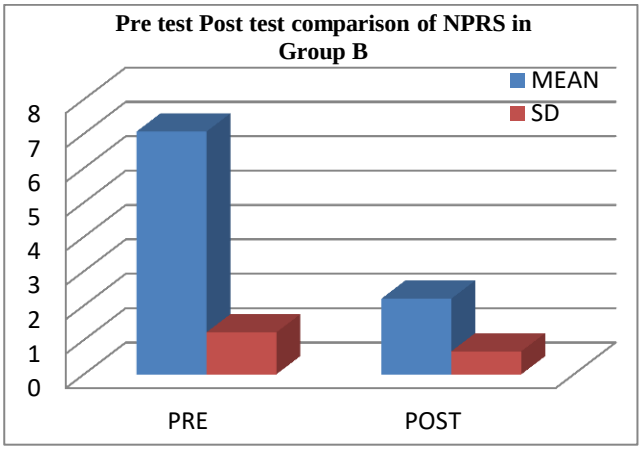

Figure 2: Pre test Post test comparison of NPRS within Group B.

Table3: Post test Comparison of NPRS between Group A and Group B

Post test comparison of NPRS between Group A and Group B.				
	Mean± SD	**Tvalue**	**PValue**	**Inference**
Group A NPRS (Post)	1.20±0.56	4.40	0.001	Significant
Group B NPRS (Post)	2.2±0.67			

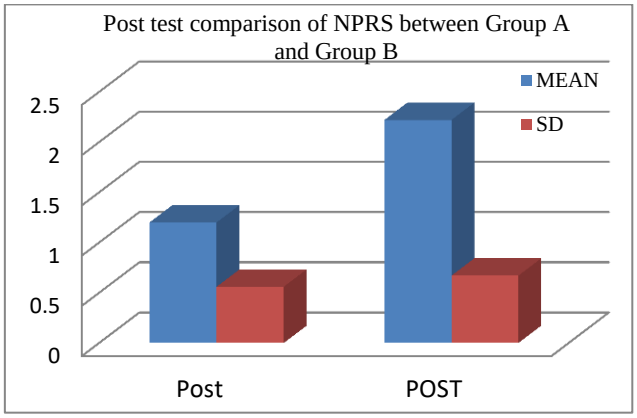

Figure3: Post test Comparison of NPRS between Group A and Group B.

3. Results

3.1 Group A

The Mean and SD of pre test and post test for NPRS of group A were 6.86 ± 1.06 and 1.20 ± 0.56 respectively. The paired t test value is 24.39 and p-value is 0.0001which is less than 0.05, hence significant. This showed that there was significant reduction in pain in Group A i.e. straight leg raise with neural tissue mobilization as seen in table 1 and figure 1.

3.2 Group B

The Mean and SD of pre test and post test for NPRS of group B were 7.06 ± 1.22 and 2.20 ± 0.67 respectively. The paired t test value is 13.9 and p- value is 0.0002whichislessthan0.05, hence significant. This showed that there was significant reduction in pain in Group B i.e. Slump Stretching as shown in table 2 and figure 2.

3.3 Comparison of Group A and Group B

The mean value and SD of posttest comparison of NPRS right side between group A and B were 1.20 ± 0.56 and 2.20 ± 0.67. The unpaired t test value is 4.40 and p-value is 0.001 which is less than 0.05, hence significant. These values suggest there was a greater reduction in pain in group A at 1 week when compared to group B as shown in table 3 and figure 3.

4. Discussion

The result of this study showed that neural mobilization technique in Straight Leg Raise is more effective in decreasing pain thus reducing the symptoms of sciatica. The slump stretching was beneficial in the management of patients with sciatica. The result in both group were statistically significant. Neural mobilization results in a number of physiological benefits that might be responsible for reducing pain. It is hypothesized that during oscillatory technique in neural mobilization in straight leg raise position there was elongating and shortening of the nerve which may temporarily increase the intra-neural

pressure followed by a period of relaxation [13]. This repeated pumping action may enhance dispersal of local inflammatory products in and around the nerve, thus alleviating hypoxia and reducing pain [14]. The neural tensioning techniques resulted in C-fiber mediated hypo-algesia which may have reduced pain in the participants [15].

Neural mobilization supposed to create neural "flossing" effect, that is, its ability to restore normal mobility and length relationship, and consequently, blood flow and axonal transport dynamics in compromised neural tissue which makes it effective in sciatica [16]. Neural mobilization was very effectual in snapping up the adhesions and bringing about mobility. Slump stretching has been found to be effective in the treatment of sciatica. It has been hypothesized that it decreases the patient's pain by depressing the intra-neural edema [17].

The slump stretching has also been associated with inhibitory effects on the sympathetic nervous system, a stimulation of which affects the capability of the nerve to stretch. Slump stretching may also be responsible for reducing scar tissue adhered to the neural tissue and surrounding structures [18].It was suggested by Maitland that slump technique would be better than straight leg raise in the treatment of lumbar disorders [19].

A study concluded that oscillatory techniques were better than static stretching since static stretching may increase intra neural pressure [20]. At the same time the findings of various studies cannot be ignored where static stretching techniques have resulted in decreased pain. In the present study, straight leg raise with neural tissue mobilization was found to be more effective than slump stretching.

5. Conclusion

From the present study it has been concluded that straight leg raise with neural tissue mobilization and slump stretching can be recommended safely to the patients with Sciatica. Though both techniques were effective in reducing pain in patients with sciatica but inter group comparison showed that straight leg raise with neural tissue mobilization technique was found to be significantly more effective in reducing pain than slump stretching.

Limitation of the study

- Limited number of subjects and lack of long-term follow up is a limitation.
- Also, subjects from all professions and different activity levels were included and may be a source of variation in results.

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