International
Journal of Medical and Exercise Science
(Multidisciplinary, Peer Reviewed and Indexed Journal)

ORIGINAL ARTICLE

A COMPARATIVE STUDY BETWEEN NEURAL MOBILIZATION TECHNIQUES VERSUS MCKENZIE EXERCISES IN PATIENTS WITH ACUTE SCIATICA

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ABSTRACT

Background of the Study: Acute sciatica is one of the most common problems affecting adult population annually. Low back pain is the single leading cause of disability and frequently accompanied by Numbness, tingling, and burning sensation in the lower extremities. The aim of the study is to compare the effectiveness of neural mobilization techniques and McKenzie exercise in patients with acute sciatica. **Methodology:** The study was a comparative study of pre and posttest type, conducted at A.C.S. Medical College and Hospital campus, with study duration of 6 weeks. Using simple Random sampling method 30subjects were randomly divided into 2 groups. Group A (n = 15) were treated with neural mobilization technique and group B were treated with McKenzie exercise. Group A with 15 subjects were treated with neural mobilization technique. This technique was performed by alternating by hip flexion knee flexion and ankle dorsiflexion. This movement were performed for 3 minutes on the dominant leg. Treatment was given daily basis for 5 consecutive days. Group B with 15 subjects were treated with McKenzie exercise like cobra stretch, lying on pillow, sphinx and standing extension exercise (hold 10 sec, repeat 10 times). Outcome Measures were Lower extremity functional scale, numerical pain rating scale, passive [SLR] test, slump test**. Results:** On comparing Pre- test and Post test within Group A & Group B on LEFS Score, NPRS Score and SLR Test shows significant difference in the mean values at $P \leq 0.05$. **Conclusion:** Greater improvement is seen in sciatica patients who received NMT (Neuro Mobilization Technique) than McKenzie exercise.

Keywords: Neural pain rating scale, Lower extremity functional scale, Passive straight leg raise, Slump test, Interferential therapy

Received on 4th May 2025; Revised on 20th May 2025; Accepted on 28th May 2025
DOI:10.36678/IJMAES.2025.V11I02.04

INTRODUCTION

Sciatic Nerve is the thickest nerve and is the largest branch of the sacral plexuses the body with root value L4, L5, S1, S2, S3. It begins in the pelvis and terminates at the superior angle of the popliteal fossa by dividing into the tibial and common personal nerves. Sciatica is the radiating pain experienced either in unilateral or bilateral lower extremities due to compression or inflammation of the lumbosacral nerve roots (L4-S1) that forms the sciatic nerve with or without associated neurological symptoms like weakness or numbness[1].

Sciatica refers to a set of symptoms including pain, numb-ness, muscular weakness, and limitations in moving or controlling legs due to compression and irritation of the sciatic nerve. Symptoms are usually found in the lower back, buttocks and several dermatomes of the leg and foot [2].

The most important symptom of sciatica is lumbosacral radicular leg pain that follows a dermatomal pattern radiating below the knee and into the foot and toes. Patients may report with sensory symptoms, limited forward flexion of the lumbar spine, gait deformity and unilateral spasm of the paraspinal muscles.[3] There are two types of Sciatica: Acute Sciatica and Chronic Sciatica.

Acute Sciatica may be foregoing between four to eight weeks; the symptoms can be reduced with the use of accessible over-the-counter painkillers combined with exercise whereas Chronic Sciatica persists for longer period. It may require physical therapy which may include exercises, applied heat and other techniques. In rare cases, surgery may be required, Sciatica can be caused due to Herniated Inter vertebral Disc (posterolateral), Lumbar Canal Stenosis, Spondylolisthesis, Spinal Tumors, Trauma, Piriformis Syndrome, Cyst of the Hip/ Lumbar, Vascular Malformations, Intrapelvic aneurysm, Obesity associated with Osteoarthritis, Osteoporosis, Rheumatoid Arthriti [4].

The prevalence of sciatica varies from 1.6% in the general population to 43% in a selected working population. Although the prognosis is good in most patients, a substantial proportion continues to have pain for 1 year or longer.[5] Sciatica is mainly diagnosed by history taking and physical examination. Patients of Sciatica complain about radiating pain in the leg. Patients may also report sensory symptoms. Physical examination largely depends on neurological testing. The confirmation of Sciatica is mainly done by Passive Straight Leg Raising Test (between 300-700) or League "s sign. If this test is positive, then Sciatica thus can be confirmed. Physiotherapy treatment of acute sciatica includes cold therapy, rest, manual therapy (spinal manipulation and soft tissue mobilization) and electrotherapy. Other forms of management include aerobic conditioning, core muscle strengthening, stretching of tight structures, mechanical traction and corsets[6].

Medical treatment include Analgesics like Tramadol which help in relieving the pain; non-steroidal anti-inflammatory drugs like Aspirin, Ibuprofen are used to reduce inflammation and relieve from pain; Muscle relaxants such as Diazepam, Baclofen are used to treat pain associated with muscle spasms. Epidural steroid injections are given to reduce the swelling and inflammation of the nerve.[7] There are some manual therapy techniques like Neural Mobilization Technique and McKenzie exercise which produce a rapid

improvement in patients with Acute Sciatica when combined with conventional therapy[8].

Neurodynamic mobilization can greatly reduce inflammatory mediators and consequently pain of sciatic nerve compression. Neurodynamic mobilization plays a great role in restoring the neural tissue ability to stress or tension via inducing reconstruction of normal physiological functions, pain reductions, and functional improvement [9].

In 1981, Robin McKenzie proposed a classification system and a classification-based treatment for LBP labeled Mechanical Diagnosis and Therapy, or simply the McKenzie method.[10] McKenzie method the direction of exercise is not always extension but instead is dictated by the directional preference. In a prospective, multicenter study including 145 patients with nonspecific LBP, Donelson *et al*31 reported a clear directional preference in nearly one half of patients. Of these patients, 40% improved with extension exercises, whereas 7% improved with flexion exercises[11].

McKenzie exercise is more effectiveness in reducing pain and disability in patient with acute sciatica in short term follow upward compared with medication[12].

METHODOLOGY

This study is a comparative pre- and post-test design conducted in the outpatient physiotherapy department at ACS Medical College and Hospital. The sample consisted of 30 subjects divided into two groups, Group A and Group B, with 15 participants each. The study duration included five sessions per week over six weeks. Participants were selected using a simple random sampling method. Inclusion criteria encompassed individuals aged 45 to 65 years of both genders who experienced pain radiating to the foot or toe, numbness and paraesthesia in the same distribution, a positive straight leg raise (SLR) test that increased leg pain, and a positive slump test reproducing neurological symptoms. Exclusion criteria included pregnant women, individuals with developmental spine deformities, severe mental impairments, failed back surgery, a history of orthopedic problems such as hip and knee injuries, and patients with a negative slump test. Outcome measures used to assess the effectiveness of the intervention included the Lower Extremity Functional Scale, the Numerical Pain Rating Scale, the passive Straight Leg Raise test, and the slump test.

Procedure: 30subject were randomly divided into 2 group. Group A (n = 15) were treated with neural mobilization technique and group B were treated with McKenzie exercise

The methodology was explained to the subject's where informed consent was obtained.

Group A and Group B with 15 subjects each. Pre-assessment of the severity of pain in sciatica is done with lower extremity functional scale and numerical pain rating exercises.

GROUP A: Neural mobilization techniques with 3mins on the dominant legs and 1 session per week along with IFT.

GROUP B: McKenzie exercises with hold 10 sec for repeat 10 times, 3 sessions per week along with IFT.

Intervention: Therapist will be explaining to the patient and how to perform the exercise. Then start by giving the exercise one by one.

GROUP A

Interferential therapy: Interferential Therapy, that uses low frequency electrical currents to relieve pain, reduce inflammation and promote healing. It works by sending low-frequency electrical impulses through the skin to stimulate the nerves and muscles in the affected area. And the electrode can be diagonally placed in the low back region of the patient with frequency of current 80-100 Hz rhythmic is used and the duration is 15-20 minutes.

Neural Mobilisation Techniques: 15 subjects were treated with Neural Mobilization Technique combined with Interferential therapy Subjects were in supine position. This technique was performed by alternating hip flexion, knee flexion and ankle dorsiflexion with hip extension, knee extension and ankle plantar flexion while the subject cervical and thoracic spine was maintained in flexion. These movements were performed for 3mintues on the dominant leg. 1 session was given daily for 5 consecutive days [13, 14,15] .

GROUP B

Interferential Therapy: Interferential Therapy has been given to the patients same like Group A.

Mckenzie exercises: In this method were treated by 15 patients. McKenzie exercise like cobra stretch, lying on pillow, sphinx and standing extension exercise (hold 10 sec, repeat 10 time)

Lying On The Stomach: Arm at the side, turning the head to the side and holding the position for 2-3 minutes.

Lying With Pillow: under the pelvis with arm at the side turning the head to the side holding the position for 2-3 minutes

Sphinx: lying on the stomach, place your elbow under your shoulder so yours are resting on your forearm and holding the position for 2-3 minutes.

Cobra Stretch: lying on stomach, place your hands your shoulder. Slowly straighten elbow: keeping lower body relax while raising the back upward as far as pain will allow and holding the position for 2-3 minutes.

Standing Back Extension: Place the hand on the back; perform extension holding the position for 2-3 minutes[16, 17].

Data Analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24, with a significance level of p value less than 0.05 and a 95% confidence interval set for all analysis. The Shapiro Wilk test was used to determine the normality of the data. In this study, Shapiro Wilk test showed that the data was normally distributed on the dependent values at $P > 0.05$. Hence parametric test was adopted. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find statistical difference between the groups.

TEST	GROUP – A		GROUP - B		t - TEST	df	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D			
PRE-TEST	28.93	5.53	29.13	5.62	-.098	28	.923*
POST TEST	73.40	3.13	56.46	4.27	12.37	28	.000**

(*- P > 0.05 - Not Significant) & (**- P ≤ 0.05 - Significant)

Table-1: Comparison of LEFS Scale Score between Group – A and Group - B In Pre And Post Test

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom (df) and p-value between Group A &Group B in pre- test and post- test.This table shows that there is no significant difference in pre- test values between Group A & Group B at P > 0.05.

The above table shows that statistically significant difference in post-test values between Group A& Group B atP ≤ 0.05.

TEST	GROUP – A		GROUP - B		t - TEST	df	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D			
PRE-TEST	6.93	.798	6.86	.743	.237	28	.815*
POST TEST	3.86	.833	5.20	1.08	-3.78	28	.001**

(*- P > 0.05 - Not Significant) & (**- P ≤ 0.05 - Significant)

Table-2: Comparison Of NPRS Score Between Group – A And Group - B In Pre And Post Test

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom (df) and p-value between Group A & Group B in pretest and posttest. This table shows that there is no significant difference in pretest values between Group A & Group B at P > 0.05.

The above table shows that statistically significant difference in posttest values between Group A& Group B atP ≤ 0.05.

TEST	GROUP – A		GROUP - B		t – TEST	df	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D			
PRE-TEST	48.60	4.43	48.80	8.26	-.083	28	.935*
POST TEST	80.26	3.32	65.40	5.87	8.52	28	.000**

(*- P > 0.05 - Not Significant) & (**- P ≤ 0.05 - Significant)

Table- 3. Comparison of SLR Test Score between Group – A And Group - B In Pre And Post Test

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom (df) and p-value between Group A & Group B in pretest and posttest.

This table shows that there is no significant difference in pretest values between Group A & Group B at P > 0.05.

The above table shows that statistically significant difference in posttest values between Group A& Group B atP ≤ 0.05.

GROUPS	PRE-TEST		POST TEST		t – TEST	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D		
GROUP- A	28.93	5.53	73.40	3.13	-35.27	.000**
GROUP-B	29.13	5.62	56.46	4.27	-53.24	.000**

(**- P ≤ 0.05 - Significant)

Table- 4. Comparison of Lefs Score within Group – A and Group – Bbetween Pre-Test And Post Test

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A &Group – B.

There is a statistically significant difference between the pretest and post test values within Group A and Group B at P ≤ 0.05.

GROUPS	PRE-TEST		POST TEST		t – TEST	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D		
GROUP- A	6.93	.798	3.86	.833	16.87	.000**
GROUP-B	6.86	.743	5.20	1.08	7.17	.000**

(**- P ≤ 0.05 - Significant)

Table- 5. Comparison Of NPRS Score Within Group – A And Group – B between Pre-Test And Post Test

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A &Group – B.

There is a statistically significant difference between the pretest and posttest values within Group A and Group B at P ≤ 0.05.

GROUPS	PRE-TEST		POST TEST		t – TEST	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D		
GROUP- A	48.60	4.43	80.26	3.32	-20.21	.000**
GROUP-B	48.80	8.26	65.40	5.87	-19.16	.000**

(**- P ≤ 0.05 - Significant)

Table- 6: Comparison Of SLR Test Score Within Group – A And Group – B between Pre-Test And Post Test

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A &Group – B.

There is a statistically significant difference between the pretest and posttest values within Group A and Group Bat P ≤ 0.05.

RESULTS

On comparing the Mean Values of Group, A & Group B on LEFS Score, it shows a significant increase in the post test mean values in both groups, but (Group A - Neural Mobilization) shows 73.40 ± 3.13 which has the higher mean value is more effective than (Group B - McKenzie Technique) 56.46 ± 4.27 at P ≤ 0.05. Hence the null hypothesis is rejected.

On comparing the Mean Values of Group, A & Group B on NPRS Score, it shows a significant decrease in the post test mean values in both groups, but (Group A - Neural Mobilization) shows 3.86 ± .833 which has the lower mean value is more effective than (Group B - McKenzie Technique) 5.20 ± 1.08 at P ≤ 0.05. Hence the null hypothesis is rejected.

On comparing the Mean Values of Group- A & Group B on SLR Test, it shows a significant increase in the post test mean values in both groups, but (Group A - Neural Mobilization) shows 80.26 ± 3.32 which has the higher mean value is more effective than (Group B - McKenzie Technique) 65.40 ± 5.87 at P ≤ 0.05. Hence the null hypothesis is rejected.

On comparing Pretest and Post test within Group A & Group B on LEFS Score, NPRS Score and SLR Test shows significant difference in the mean values at P ≤ 0.05.

DISCUSSION

Sciatica is a radiating pain that can affect one or both lower extremities and is caused by inflammation or compression of the

lumbosacral nerve roots. (L4-S1), which forms the sciatic nerve, may or may not be accompanied by neurological symptoms such as numbness or paralysis. The purpose of this study is to evaluate the efficacy of McKenzie and neural mobilization techniquesin the management of sciatica. In Group A neural mobilization Techniques was given to 15 patients and in Group B McKenzie exercise was given to 15 patients' and Post Test were taken using lower extremity functional scale Between the group analysis of pretest and post intervention and results shows neural mobilization Techniques is more prominent in treating sciatica.

On comparing the Mean Values of Group- A & Group B on LEFS Score, it shows a significant increase in the post test mean values in both groups, but (Group A - Neural Mobilization) shows 73.40 ± 3.13 which has the higher mean value is more effective than (Group B - McKenzie Technique) 56.46 ± 4.27 at P ≤ 0.05. Advantages of these exercises reduce intraneural swelling, improve circulation to thenerve, and reduce the low back and radiating pain, increase the range of motion, improve the functional activity This current study was to find which exercise is effective.for relieving sciatica.

In study by Michael Shackiock –Neurodynamics –1995, the method relies on influencing pain physiology via mechanical treatment of neural tissue and the non- neural structure surrounding the nervous system [18].

In study by Khan M, Khan DA, Khan MI.- Effectiveness of McKenzie exercise on pain and disability in acute discogenic sciatica Ann Allied science -2015. [this study Recommends that treatment based on McKenzie therapy is more effective in reducing pain and disability in patient with acute sciatica in short term follow upward. compared with medication. Treatment program based on conventional therapy doesn't produce satisfactory result in patient suffering from acute sciatica [19].

In study by Kumar Manish, Garg Gaurav, Singh L.R. "Epidemiology, Pathophysiology and Symptomatic Treatment of Sciatica: A Review." International Journal of Pharmaceutical and Biological Archives 2011. Concluded that term effects of surgical intervention are unclear and that evidence on the optimal timing of surgery is also lacking [20].

Comparision of nerve flossing and conventional therapy with only conventional therapy for sciatica Darshana D. Chaudhary*1 , Neha Ingale2 , Kalyani Nagulkar3Nerve flossing technique can be utilized with other mopdalities in the treatment of subacute sciatic patients due to low backs ahe for the relief of pain and sensory symptoms like tingling and numbness, restoration of spinal mobility and to minimize functional disability. Limitation, Lesser number of subjects. No group had similar patients with same dand to minimize functional disability[21].

In study by JT Silva, AC Giardini, In summary, our data reveal that NM session can improve axon regeneration in sciatic nerve and its mechanism could be by NGF and MPZ upregulation after a physiotherapy treatment, showing the relevance of a non-pharmacological intervention[22].

In study by Bronfort G, Haas M, Evans R, Leininger B, Triano Jrecovery of circulation and nutrition occur optimally through movement, musculoskeletal tissue changes, dimension and exert mechanical forces on neural structure,

minimize forces on adjacent neural structure, the increase tenson and intra neural pressure facilitate venous return, disperse edema.[23]

In study by Vartak H.S., Rajapurkar R. A comparative study between neural mobilization techniques versus nerve flossing technique in patients with acute sciatica, 9 (3): 909-22, 2019 [24]

CONCLUSION

The study concluded that the subjects in a GROUP- A performing (neural mobilization techniques along with interferential therapy) shows more improvement in exercises reduce intraneural swelling, improve circulation to the nerve, and reduce the low back and radiating pain, increase the range of motion, improve the functional activity than in GROUP- B (McKenzie exercise along with interferential therapy) for sciatica.

Thus, it can be assumed from this study GROUP –A neural mobilization techniques along with interferential therapy) shows more improvement in exercises reduce intraneural swelling, improve circulation to the nerve, and reduce the low back and radiating pain, increase the range of motion, improve the functional activity.

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