



EFFECTIVENESS OF NEURAL MOBILISATION AND MCKENZIE TECHNIQUE IN MANAGEMENT OF UNILATERAL LUMBAR RADICULOPATHY

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ABSTRACT

Low back pain is the second leading reason why primary care consultation is sought 1 and one of the most common reason for low back pain is herniation of intervertebral disc in spinal canal 2. Lumbar disc herniation is believed to be a major contributor to the estimated 60-80% of lifetime incidence of low back pain in general population. 3 The annual incidence of lumbar disc herniation has been estimated to be 1% of the total population.

Keywords:

Neural
Mobilisation,
Mckenzie
Technique,
Unilateral Lumbar
Radiculopathy.



Introduction

Low back pain is the second leading reason why primary care consultation is sought 1 and one of the most common reason for low back pain is herniation of intervertebral disc in spinal canal 2. Lumbar disc herniation is believed to be a major contributor to the estimated 60-80% of lifetime incidence of low back pain in general population. 3 The annual incidence of lumbar disc herniation has been estimated to be 1% of the total population.

Radiculopathy is a disorder involving compression, impingement, irritation or inflammation of a spinal nerve root, which may be due to a disc protrusion or any local degenerative disorder compromising the intervertebral foramen. It is characterized by the presence of true neurological signs and symptoms (Saunders and Saunders 2004) and associated with radicular pain. In the lumbar spine, radicular leg pain is often a result of lumbar intervertebral disc pathology.

Cost of treatment of low back pain in United States is estimated to be approximately 31 billion dollars per year and disc related disorders of spine are estimated to comprise a high percentage of low back pain population.5 Symptomatic lumbar disc disease is responsible for tremendous cost to society.

Lumbar disc herniation is among the most common causes of sciatica.2 More than 90% of these radicular lesions are protruded intervertebral discs.6 Patients with lumbar radiculopathy represent large segment of population who consume care costs related to lumbar disc disease.

Physiotherapy is one of the major components of non-operative treatment. Literature is available for beneficial effect of physical therapy in management of lumbar disc herniation. It not only reduces pain but it also limit days off from work.

McKenzie

McKenzie in the treatment of the derangement syndrome causes extension of the lower cervical segments and may alleviate stress on the posterior annulus and thereby relieve pain. In patients with neck and radicular pain, repeated neck retraction was shown to result in a significant decrease in peripheral pain and decreased nerve root compression, whereas neck flexion produced an increase in peripheral pain and nerve compression. Additional benefits may occur. In a study of normal subjects, individuals adopted a less protracted posture after repeated neck



retraction movements

(up to four weeks), the sub-acute period (4-12 weeks), and chronic (>12 weeks).

Lumbosacral Radiculopathy

Lumbosacral radiculopathy is a condition in which a disease process affects the function of one or more lumbosacral nerve roots. The most common cause is structural (ie, disc herniation or degenerative spinal stenosis) leading to root compression.

Lumbosacral radiculopathy is a term used to describe a pain syndrome caused by compression or irritation of nerve roots in the lower back. It can be caused by **lumbar** disc herniation, degeneration of the spinal vertebra, and narrowing of the foramen from which the nerves exit the spinal canal.

Some of the major causes of acute and chronic low back pain (LBP) are associated with radiculopathy. However, radiculopathy is not a cause of back pain; rather, nerve root impingement, disc herniation, facet arthropathy, and other conditions are causes of back pain.

Phases of Lumbosacral Radiculopathy

Phases of Lumbosacral Radiculopathy The three generally accepted time frames used to classify lower back pain are the acute period

- Acute lumbosacral radiculopathy is often exquisitely painful, the likelihood of spontaneous improvement is high when the cause is disc herniation or lumbar spinal stenosis due to degenerative arthritis.
- In both subacute and chronic lumbosacral radiculopathy, exercise therapy is particularly beneficial when the exercise approach includes aerobic activity and is accompanied by biopsychosocial based approaches that include cognitive behavioral strategies facilitating a graded exercise regimen.

There are two methods of treatment for lumbosacral radiculopathy that draw a lot of attention in the medical field, the Alexander technique and the McKenzie method.

Methods of Diagnosing

Lumbar disc herniation and radiculopathy can be diagnosed through a multitude of tests ranging in cost and reliability. Three of the most common tests used to diagnose lumbar disc herniation and radiculopathy are manual muscle testing, thermal quantitative sensory



testing and the supine straight leg raise, also known as the Lasegue test. 4 These tests provide the patient the most efficient diagnosis possible without performing an operation or receiving an MRI or CT scan, which is desirable for many patients due to the physical and economic stresses these would impose on them.

McKenzie Method for Treatment

The McKenzie method for treatment of patients with lumbosacral radiculopathy causing low back pain Mr. Smith, a patient of Dr. McKenzie, came in because of radiating pain going down the side of his leg for the past three weeks. McKenzie inadvertently had Mr. Smith lay on his stomach on an inclined exam table in lumbar extension. After 10 minutes of this, Mr. Smith informed the flabbergasted Dr. McKenzie that his leg had not felt this good in weeks! This encounter began McKenzie down a path that ultimately led to his development of the McKenzie method.

The McKenzie method for treatment of lumbosacral radiculopathy causing lower back pain and inhibited movement is based on directional preference in which patients are taught to perform exercises that focus low back and/or radiating pain toward the spinal

midline, using repeated movements or sustained postures. This method can efficiently reverse the damage done by the patient to their intervertebral discs and nerves by simply performing patient-generated forces in the prescribed direction.

McKenzie first described centralization of pain in 1980. Centralization of pain is the movement of pain that may be in the buttock, thigh, knee or foot, and eventually transitioning it towards the low back where it ultimately is eliminated (Figure 1). If the individual is experiencing pain in their foot, the pain will move proximally towards their knee after they begin the appropriate exercises. This pain will then continue moving proximally through the thigh, buttock, low back, and eventually it will be completely eliminated. The extension of the spine from the exercises causes a decompression of the spine and a decrease of nerve root impingement. This lessening of impingement allows the affected nerve to progressively return to its normal physiological status. As the nerve is healing, the pain the patient is experiencing is gradually moving proximally up their leg. Patients that are receiving treatment via the McKenzie method must understand this fact in order to ensure



completion of the treatment. A patient that develops pain in their knee after having severe pain in their foot for a long period time may be quick to bail on the McKenzie method of treatment due to the new pain.

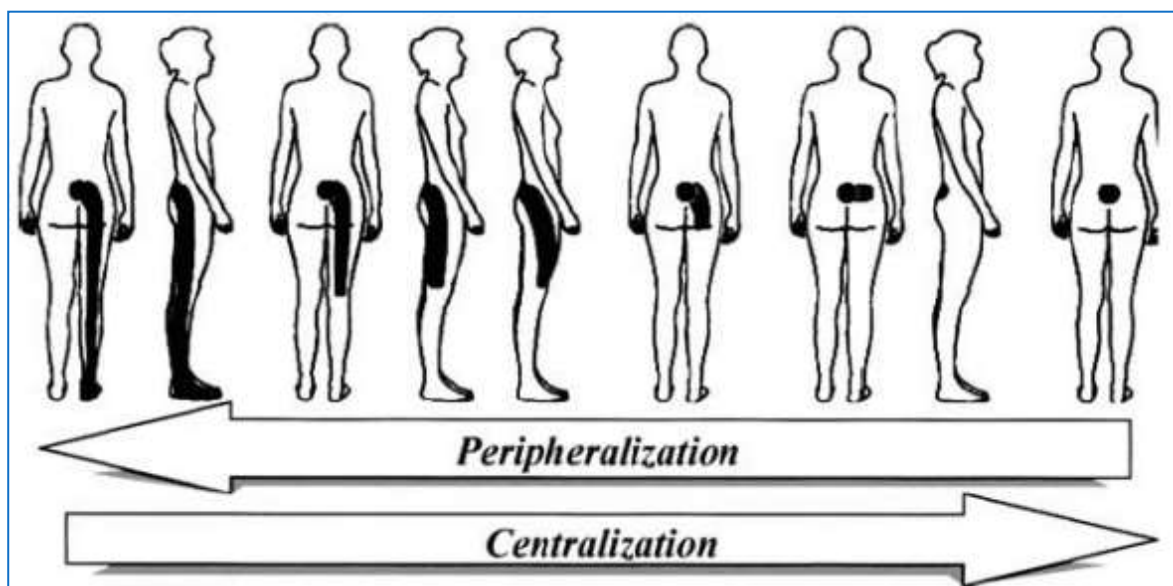


Figure 1. “Centralization” is the progressive retreat of pain arising from the lumbar spine in a proximal direction, retreating back toward or completely to the lumbar midline. Centralization is indicative of improving the underlying pain source, and peripheralization indicates it is being aggravated further.

Indications

McKenzie exercises are prescribed to patients who exhibit the centralization phenomenon of back pain. Exercises are indicated based on directional preference, and their indication is

the same direction of directional preference. For example, is a patient exhibits a directional preference for spinal extension (most common), the exercises performed will be in spinal extension.



Technique

Physical therapists trained in the Mckenzie method will prescribe exercises in association with the centralization phenomenon mentioned above. Given that most people classify with a directional preference for spinal extension, this will be the direction of their prescribed exercises.

Examples of such spinal extension exercises include, but are not limited to:

- i. Prone position lying flat (patient lies flat on their stomach)
- ii. Prone position propped on elbows (patient lies flat on their stomach and props themselves onto their elbows with the spine in extension)
- iii. Prone position propped on hands (patient lies flat on their stomach and props themselves onto their hands with elbows in full extension, with the spine in extension)
- iv. Standing lumbar extension (patient stands upright with feet shoulder-width apart, and puts hands on the lower back while extending the spine)

Similar exercises may be performed targeting spinal flexion, rotation, or lateral bending.

1.1 REVIEW OF LITERATURE

Sreenivasu Kotagiri (2018) - Cervical Spondylitis (CS) is a common term that denotes degenerative changes that develop with of trauma-centre patients, specific age groups, and head injury patients. A study done on Indian population reported 78% of radiological changes of CS at C5-C6 and C6-C7 levels in asymptomatic individuals. These degenerative changes in the cervical spine may remain asymptomatic or can present as pure axial neck pain, cervical radiculopathy, cervical myelopathy, or cervical myeloradiculopathy. So, the aim of the study was to check the effectiveness of Mulligans Mobilizations with Upper Limb Movement and McKenzie Exercises with Neural Mobilizations in Patients with Cervical Spondylitis. : 60 patients were included in the study which was divided into two groups ; Group A and Group B, 30 patients in each group. Subjects were randomly selected and assigned to each group A pre-test measurement with the help of two measures - Northwick Park Neck Pain Questionnaire (NPNPQ) for disability and Visual Analog Scale (VAS) Inclinator for a range of



motion cervical spine movements was done in each group. Subjects in Group-A were given Mulligan Mobilization with Upper Limb Movement for cervical regain for 45 minutes 4 days for one week in four weeks subject were sitting Subjects in Group-B was given McKenzie Exercises with Neural Mobilization for 45 minutes 4 days for one week in four weeks subject were in supine position and remains relaxed with the feet uncrossed. Result analysis was done by Wilcoxon Sum Rank Test (Mann Whitney U Test). On comparing Group A and Group B for post-treatment VAS score and NPNPQ score, results showed a significant difference ($p=0.001$) in improvement in terms of VAS and NPNPQ. The overall study proved that both Mulligan mobilization with upper limb movement and McKenzie exercises with neural mobilization were effective in improving Pain and decreasing the disability level in cervical radiculopathy subjects. McKenzie exercise with neural mobilization is better than mulligan mobilization with upper limb movements in cervical radiculopathy. Results supported that McKenzie exercise with neural mobilization was more effective than mulligan mobilization to improve pain and disability in a patient with cervical radiculopathy.

Waleed Salah El-din Mahmoud (2015) -
Objective: to investigate the effects of neural mobilization and lumbar manipulation techniques on leg pain, functional disabilities, and degree of nerve root compression of chronic low back pain (CLBP) patients with sciatica resulted from lumbar disc herniation at L5-S1 level and also to determine which treatment was more effective than the other. Design: Randomized clinical trial. Materials and methods: Sixty patients with confirmed unilateral lumbosacral radiculopathy due to L5-S1 disc herniation from both sexes were involved, aged between 30 – 50 years. They were randomly divided into two equal groups, (group A) received neural mobilization techniques and (group B) received lumbar manipulation techniques. Main outcome measures: Visual analogue scale (VAS), Oswestry Disability Index (ODI), and degree of nerve root compression by grading system were measured for all patients before treatment, after 6 weeks of treatment. Results: There was a positive significant effect of both types of treatment on all outcome measures, however there was a significant difference between the (group B) and (group A) adjusted to baseline values and at 6 weeks post treatment in respect to: leg pain ($P=0.006$), Oswestry Disability Index ($P =0.001$), and



degree of nerve root compression ($P=0.037$).

Conclusion: The lumbar manipulation was more effective than neural mobilization; this may be due to direct influence of lumbar manipulation techniques on reduction of nerve root compression than neural mobilization techniques.

Volpato CP et, al (2014) - The outcomes of strengthening and stretching of the iliopsoas muscle connected with segmental stabilization versus stabilization alone, in the treatment for LBP were compared. Fourteen patients were randomly allocated into three groups. Segmental stabilization training (ST) only was given to the first group; the second was submitted to ST and stretching of the iliopsoas muscle (ST-Stretch), and the third was given ST and strengthening of the iliopsoas (ST-Strength). The group ST ($p = 0.006$) and STStrength ($p=0.092$) showed significant improvement in the VAS scale. The extension flexibility illustrated significant improvement in the group ST- strength ($p=0.038$). ST alone, or associated with strengthening of the iliopsoas, proved more effective for improving lumbar pain and flexibility compared to ST Stretch.

Sahiba Yadav et, al (2014) - Various manual therapy techniques are known to treat discogenic pain. Research is limited and controversial in the effectiveness of manual therapy for treatment of lumbar radiculopathy due to lumbar disc disease. In manual therapy, Mulligan has described spinal mobilisation with leg movement technique, for improvement in lumbar lesion resulting in pain and other signs below knee. To find out if Mulligan's Spinal Mobilisation with Leg Movement technique (SMWLM) in conjunction with conventional treatment is better than conventional treatment alone in improving leg pain intensity (VAS), localization of leg pain (body diagram by Donelson), back specific disability (RMQ) in patients with lumbar radiculopathy (L5 / S1 nerve root) in lumbar disc herniation. The study is a randomized controlled trial performed on 30 patients with lumbar radiculopathy. Both the groups received back extension exercises, hot pack, precautions and ergonomic advice. The experimental group received SMWLM technique in addition to the conventional treatment. Outcomes included leg pain intensity, Roland Morris Questionnaire and body diagram by Donelson. There was significant improvement in VAS ($p=0.000$), body diagram ($p=0.000$ for



experimental group and $p=0.003$ for conventional group) and Roland Morris Questionnaire score ($p=0.000$) within the groups. Between group analysis showed significant improvement in VAS ($p=0.000$), body diagram score ($p=0.000$). Although there was significant improvement in Roland Morris Questionnaire score within the groups but there is no significant difference between the group ($p=0.070$). Spinal Mobilization with Leg Movement technique in addition to conventional physical therapy produced significant improvement in leg pain intensity, location of pain and back specific disability in patients with lumbar radiculopathy in lumbar disc herniation.

Riley JA, BSc (2011) - Patients with lumbar radiculopathy are often managed with manual therapy. The aim of this single case study was to describe the outcome of manual therapy treatment of a patient with lumbar radiculopathy. A 47-year-old female presented with acute, severe left buttock and posterolateral thigh pain. Symptom provocation occurred during lumbar flexion, coughing, and sneezing, driving and prolonged sitting. Her left straight leg raise neurodynamic test was limited and reproduced her pain, as did trigger points in the left

lumbar and Gluteal muscles. Clinical neuro-conduction testing revealed weakness of the big and other toe extensors, as well as eversion and plantar flexion of the left ankle, and a diminished left ankle reflex. This indicated possible involvement of both the L5 and S1 nerve roots. A manual therapy treatment approach including lumbar rotation mobilizations (Maitland approach), massage, trigger point pressure release and Transversus Abdominus muscle activation was used. The patient was symptom free, had full pain-free range of all lumbar movements, a full pain-free left straight leg raise neurodynamic test and normal neurological conduction six weeks after onset, following seven manual therapy treatments. Although the results of this case report cannot be generalised, it describes the successful outcome of a patient with severe radicular pain and neurological deficits, whose signs and symptoms had completely resolved following manual therapy treatment.

Ladeira CE (2011) - A review of recommendations for conservative management of low back pain published in EBP was done since 2002. Various databases such as Google web, MEDLINE, COCHRANE and guideline clearing house were searched for guidelines addressing



evidence based management of LBP. Thirteen multidisciplinary and three mono disciplinary guidelines met the inclusion criteria and were triaged into three groups; LBP with red flags, radiculopathy and non specific. All studies had patient education in common. Exercises were recommended for acute, sub acute and chronic LBP cases with or without spinal manipulation. In conclusion, it was recommended that more mono disciplinary guidelines need to be designed

Mohseni-Bandpei, Cntchley and Staunton (2006) have conducted a study to assess the short- and long-term effectiveness of spinal manipulation therapy, and to identify the effect of manipulation on lumbar muscle endurance in patients with chronic low back pain. One hundred and twenty patients with chronic Low back pain were allocated at random into the manipulation/ exercise group or the ultrasound/ exercise group. Both groups were given a programme of exercises. In addition, one group received spinal manipulation therapy and the other group received therapeutic ultrasound. Pain intensity, functional disability, lumbar movements and muscle endurance were measured shortly before treatment, at the end of the treatment programme and 6 months after randomisation

using surface electromyography.

Barker K, Shamley D, Jackson D (2004) - A prospective cross sectional observational study was done to determine the association between wasting of psoas and multifidus in fifty patients with unilateral low back pain. The outcome measures used were MRI scans, presenting symptoms, reported pathology and disability. Subjects with a symptom duration of over 12 weeks were recruited. The Cross surface area was measured. Results showed a significant difference in the CSA of muscles on both sides. A positive correlation was also noted between the percentage in difference of CSA and pain rating ($p < 0.01$). The study provides an evidence for involvement of psoas in the origin of back pain and suggests an exercise program for psoas in the treatment of back pain

1.2 PROBLEM STATEMENT

Low back pain (LBP) is the most common musculoskeletal problem worldwide. Up to 85% of people will experience low back pain during their lifetime.¹ LBP has a great impact on quality of life, lifestyle, and work-related disability. Each year, the costs of LBP in the United States exceed \$100 billion is critical that the physician apply as close to equal



pressure as possible to each side of the patient to eliminate as much human error as possible. It is also critical that the physician does not do more damage to the patient by repeatedly performing manual muscles tests in a short period of time, as well as hold a manual muscle test for longer than needed to determine the approximate weakness of the patient.

The Lasegue test, also known as the straight leg raise test, can be used to test for a lumbar disc herniation at the L5-S1 junction, which is one of the more common locations of disc herniation in the lumbar spine. In this test, the patient lies in a supine position and the physician lifts the patient's leg, causing passive flexion of the hip with the knee fully extended. The physician should lift the leg between 30° and 70° off the table while looking for a pain response in the sciatic nerve distribution of the leg. The sciatic nerve distribution of the leg is the lower extremity, ankle and foot. This test is very sensitive but not very specific. To alleviate this problem with the test, the crossed leg Lasegue test can be performed. In this test, the patient's other leg is raised between 30° and 70° and a pain response is looked for in the patient's originally tested leg. If the patient shows a

pain response, this is an indicator of an L5-S1 disc herniation. The Lasegue test and crossed leg Lasegue was positive in 94% of patients with lumbar disc herniation.⁴

1.3 RATIONAL OF STUDY

The McKenzie method of treatment of lumbosacral radiculopathy causing lower back pain and inhibited motion is actually based on directional preference where individuals are actually trained to do exercises that focus very low again and/or radiating soreness toward the spinal midline, by using repetitive techniques or even sustained postures. This particular method could effectively overturn the harm done by way of the patient to the intervertebral discs of theirs and nerves simply by performing patient generated forces in the prescribed path.

A big emphasis of the medical community is the best way to not merely relieve the pain related with pain producing disc pathologies, but additionally totally stop the problem by reversing the signs. It's crucial that you be aware that this's a reversible state, not really a Figure 1. "Centralization" is actually the progressive retreat of soreness arising out of the lumbar spine in a proximal path, retreating back toward or even totally to the lumbar



midline. Centralization is a sign of enhancing the underlying pain supply, as well as peripheralization suggests it's being aggravated more irreversible neuro compression. The McKenzie method seeks to do this goal of reversing the signs by way of a number of spinal motions to initially identify the patient, and then to remedy them. Sticking to the McKenzie method to cure disc pathologies, a patient with disc pathology has his or maybe her spine manipulated to elicit sometimes a peripheralization or maybe centralization of his or maybe the pain of her. This's carried out via directional lumbar examination moves to figure out the patient's directional preference.

1.4 SCOPE OF THE STUDY

The majority of the population is actually being affected by back pain at some point that interferes with their Job, day by leisure as well as day activities. Back pain affects both actual physical ability and psychosocial health.

Both sexes are just as influenced between the ages of twenty five as well as sixty by very low back pain. You will find many treatments readily available to deal with very low back pain, although different method of exercises can be found, with the emphasis of better

treatment. This particular study would want finding out the effectiveness of McKenzie method exercise as well as neural mobilization of radiculopathy low back pain repairing purposeful capacity and increasing spinal extension in persistent Low Back ache.

1.5. SIGNIFICANCE OF THE STUDY

Radiculopathy also referred to as nerve root pain which develop from spinal stenosis or disc herniation or maybe post-operative scarring, it radiates down the leg in a dermatomal pattern, the unilateral leg pain is usually discussed by the patient as even worse compared to the back pain. Neural mobilization and mckenzie technique methods are actually the types of hand-operated therapy which are used in an attempt to minimize radiating pain and improve range of motion. Effective and efficient management of intense low back pain is recommended hence to learn the usefulness of both methods in managing persistent low back with radiculopathy was the goal of this particular analysis report.

1.6 OBJECTIVES OF THE STUDY

- i. to find out the effects of McKenzie Technique and Neural Mobilization on pain, and functional ability in patients



- ii. To use the McKenzie technique to increase the lumbar spine ROM and in reduction of pain
- iii. To analyze the effectiveness of McKenzie exercise in patient with lumbar radiculopathy
- iv. To experiment the use of McKenzie technique to increase the lumbar spine ROM and in reduction of pain
- v. To assess the McKenzie group that significantly greater improvements in pain and function after three sessions.

1.7 RESEARCH METHODOLOGY

Materials

- Treatment Couch
- Pillows
- Blankets
- Stethoscope
- B.P Apparatus
- Traction Machine
- Traction belt
- Foot Stool
- TENS
- Electrodes
- Cable
- Gel
- Cotton/Tissue papers

Methodology

- All patients underwent a Orthopaedic examination and posture evaluation.
- The Slump test, Faber's test, Bilateral straight leg raising test, and Prone lumbar instability test is conducted to confirm the diagnose of Chronic LBA
- VAS is conducted to know the severity of Pain in patients with Chronic Low Back Ache.
- MODQ is conducted to know the severity of the Disability in patients with Chronic Low back Ache.

Population

Patient with Chronic Low Back Ache with Radiculopathy who were between 25-60 year considered as population.

Inclusion Criteria

- A patient with chronic low back pain with radiculopathy
- Age 25-60 years
- Both sexes
- Centralization phenomenon, determined by using active movements testing has to be presents
- Symptoms more than 3 months



Exclusion Criteria

- ✓ Inflammatory
- ✓ Infection
- ✓ Metabolic disorders of spine
- ✓ Malignancy
- ✓ History of vertebral fracture
- ✓ Current pregnancy
- ✓ History of spinal surgery
- ✓ Patient with neurological deficit
- ✓ Patient with cardiovascular involvement
- ✓ Psychological pain
- ✓ Morbid obesity
- ✓ Structural deformity on spine
- ✓ Osteoporosis
- ✓ Spondylolisthesis
- ✓ Unco-operative patients

Source of Data

- Nandha College of Physiotherapy, Erode
- Government Head Quarters Hospital, Erode
- L.K.M Hospital, Erode.

Sample Size

- Sample size is 30 subjects
- Group A-15 patients
- Group B-15 patients

Study Design

Pre and Post experimental Study Design

Sampling Method

Convenient Sampling Method

Variables of the study

Independent variables

- a) McKenzie Technique.
- b) Neural Mobilization.

Dependent Variable

- a) Visual Analogue Scale.
- b) Modified Oswesry Disability Questionnaire.

Duration of the Study

6 Months

Treatment Duration

- Study was carried out for 4 weeks for each individual.
- McKenzie Technique was performed 20 minutes session five days per week.



- Neural Mobilization was performed 3 minutes on/off 3 repetition session five days per week.
- Both group participants received treatment of TENS for 15 minutes and traction for 20 minutes.

Parameter

(a) Visual Analogue Scale

(b) Modified Oswestry Disability Questionnaire.

1.8 LIMITATIONS

- Study focused only on Chronic Low Back Ache not on acute.
- Study was not focused on any particular occupation or athletic population
- The study has been conducted on small sized sample only.
- This study took shorter duration to complete.
- This study is not extended more than 4 weeks for a patient due to time constraint

1.9. EXPECTED OUTCOME

A patient committed to healing themselves from lumbosacral radiculopathy will be successful a large majority of the time, and only rarely will surgery be required so long as they closely adhere to the McKenzie method treatment plan. The treatment of lumbosacral radiculopathy and low back pain, an area of focus should be on the long-term impact of repeated treatment via the McKenzie method. Research should also focus on how treating lumbosacral radiculopathy in this way affects different age groups. Overall, more research would be beneficial on the treatment of lumbosacral radiculopathy to find the most comprehensive treatment available to patients who are looking to avoid invasive treatment.

From the result of this study through McKenzie technique shows improvement in pain and range of motion in Chronic Low Back Ache. This technique has more advantages over functional abilities. Clinically it is important after Chronic LBA to regain the sufficient functional abilities. Based on 't' value and standard deviation, there is considerable improvement in the condition of the patient. Henceforth, McKenzie technique helps in improving quality of life of the patient. Through the results, Alternative



Hypothesis Is Accepted and also study could be concluded that there is a significant difference in Mckenzie technique patient with Chronic LBA.

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