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Comparative study on the Mckenzie technique with tens versus neural mobilization with tens in chronic low back pain with radiculopathy

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Abstract
Radiculopathy or nerve root pain arises from disc herniation, spinal stenosis/post operative scarring, radiating down the leg in a dermatomal pattern. This study focuses on disability, pain & ROM of spine. The study evaluates "The effectiveness of Mckenzie technique and TENS versus Neural mobilization and TENS on reducing symptoms and disability of lumbar radiculopathy. 100 patients, 50 in each group, 25-60 years. Gender- Both, with radicular pain in L4, L5and S1 dermatomes. Subjects were rehabilitated for 8 sessions. Patients were evaluated with VAS, MODI, MMST, pre & post intervention. Group-A**:** Mckenzie technique and TENS, Group-B**:** Neural mobilization and TENS. On of 8th day the result showed both groups have significant improvement but the efficacy of Mckenzie Technique and TENS was more effective in relieving pain, improving functional disability and increase in Lumbar ROM. Mckenzie and TENS is more significant than Neural mobilization and TENS in patients with Lumbar Radiculopathy.

Keywords: Tens (Transcutaneous electrical nerve stimulation), Vas (Visual analogue scale), MMST (Modified-modified schober test), Modi (Modified oswestry disability index), Mckenzie technique, neural mobilization

1. Introduction
Low back pain (LBP) is one of the most widely recognized conditions that debilitate people functional capacity in activities of daily living and at work, as well as their general wellbeing and quality of life. Around 80% of the population experience spinal pain sooner or later in life. It represents an especially socio-economic problem due to the costs associated with repeated treatments, long-term absence from work and need for social support [1].
Back pain may be classified by various methods to aid its diagnosis and management. The duration of back pain is considered in three categories, following the expected pattern of healing of connective tissue. Types of low back pain: 1. Acute pain lasts up to 12 weeks. 2. Subacute pain refers to the second half of the acute period (6 to 12weeks) and. 3.Pain that stays beyond 12 weeks is considered chronic pain. The most cause of neurologic impairment including weakness or numbness results from a herniated disc [2].
Nerve root pain also called as radiculopathy arises from disc herniation, spinal stenosis or post-operative scarring. It radiates down the leg in a dermatomal pattern. This pain is often describe worse than backpain. In approximately 90% of the cases of radiculopathy is caused by herniated disc with associated nerve root compression but lumbar stenosis and less frequently tumors are the possible causes. Approximately 3-5% of the population are affected by chronic low back pain with radiculopathy were men and women are equally affected. Men are affected in their 40's while women are affected in the later ages of 50 to 60 of those who have this condition, 10-25% develop symptoms that persists for more than 6 weeks [3].
Sciatica, the classic presenting symptoms of lumbosacral radiculopathy, is characterized by pain in the back radiating to leg. Patients describe this pain as sharp, dull aching, burning or throbbing. Pain related to disc herniation is exacerbated by bending forward, sitting, coughing or sometimes walking. Characteristic feature of lumbar canal stenosis is worsening of pain during walking and relieved by bending forward. Paraesthesia is specific to pain radiation and this helps in identifying the level of involvement [4].

Pain in lumbar area accompanied by restriction in range of motion (ROM) and functional limitation is the main characteristic feature. Risk factor include age, heredity, impact of activity, and occupation [5].

Therapeutic modalities is a broad term referring to a variety of instruments, machines, and tools traditionally used in physical therapy for musculoskeletal conditions including chronic low back pain [7]. Transcutaneous electrical nerve stimulation (TENS) is a noninvasive therapeutic modality that has been used in the management of chronic low back pain. TENS units stimulate peripheral nerves via skin surface electrodes at well-tolerated intensities and are capable of being self-administrated. The development and application of TENS were based on the Gate Control Theory concept.[8] According to this theory, the stimulation of large diameter, (A-beta) primary sensory afferents activates inhibitory interneuron in the substantiagelatinosa of spinal cord dorsal horn and thereby attenuates the transmission of nociceptive signals from small diameter A-delta and C fibers [6].

Two proceduresare commonly used: 1) prolonged stimulation at low intensities through an active electrode over the painfull area, and 2) stimulation at higher but not painful intensities over the painful area for relatively brief periods, 20 to 30 minutes, for example [8].

The way of back treatment offered by McKenzie is different. Examination, treatment and prevention overlap with this method. The patient is taught how to perform activities of daily living in an ergonomic way from day one. Characteristic for this method is an effective treatment for current episode of illness and prevention of relapses [9].

Classification method by Mckenzie follows a comprehensive clinical examination and evaluation of patient's symptomatic response to different loading strategies applied to the spine. Findings from this examination decide low back pain to be one of three syndromes: derangement syndrome; dysfunction syndrome; or postural syndrome. The main concept of treating in the Mckenzie method is exercise [1].

The centralization phenomenon is the most important pattern of pain response observed in McKenzie's assessment, as well as the most studied feature of the McKenzie method. Centralization is defined as the situation in which referred pain arising from the spine is reduced and transferred to a more central position when movements in specific directions are performed (also called directional preference) [1].

Neural mobilization technique is one of the interventions which are used for treatment of low back radiculopathy. The aims to mobilize the peripheral neural tissue and structures surrounding them thus influencing the mechanical properties of peripheral nerve. Physical therapists used these techniques for management of different neural tissue compression disorders and other disorder include neuropathic pain to restore the mechanical function of impaired neural tissue [7]. And neural mobilization is also aimed at reconstructing normal neuromechanical condition, i.e. adapting the nervous system to constantly changing loads and mechanical tension.

The principle of neural mobilization tells us that changes in the mechanics or the physiology of the nervous system can result in different system and musculoskeletal structure dysfunctions. The neural mobilization technique helps in regaining the movement and elasticity of the nervous system, thus improving neurodynamics and re-establishing exoplasmic flow leading to restoration of nerve tissue homeostasis, which promotes return to its normal functions. The technique is also used to regain joint flexibility [10].

This study was implemented to learn the effect of McKenzie technique with TENS and Neural mobilization with TENS in the early recovery of low back pain with radiculopathy in improving strength, range of motion, and promoting early return to activity, encouraging active coping strategies, and improving functional status. The prognosis of the treatment was assessed using visual analog scale (VAS), modified-modified schober (MMST) and modified oswestry disability index (MODI).

2. Material and methods

2.1 Design: A radomized comparative study.

2.2 Study Setting: Subjects were recruited from KIMS in-patient and out-patient department of orthopedics and out-patient department of physiotherapy.

2.3 Study duration: 12 months.

2.4 Sample size: 100 (50) in each group

2.5 Sampling method: A random sampling method

2.6 Method of collection

Materials used in this study was: VAS, MODI, TENS, 4 Leads and 4 carbon electrode, Cotton, Pillow, Couch, Consent form, Measurement tape, Cord, Assessment form, Blanket, Pen.

Both male and female Subjects with the diagnosis of chronic low back with radiculopathy were included if they met with the following criteria: 1. LBP and symptoms extending distal to the gluteal region on lower extremity. 2. Patients age between 25-60 years. 3. The centralization phenomenon, determined by using active movements testing has to be present. 4. Symptoms more than 3 months. 5. Subjects who are willing to participate and have been explained and signed the written informed consent. Subjects were excluded if 1. Patients with inflammatory, infection, metabolic disease of spine and malignancy. 2. Patients with history of vertebral fracture. 3. History of spinal surgery. 4. Patients with neurological defects such as altered sensation, muscles weakness, altered deep tendon reflex. 5. Cardiovascular disorder and psychological pain.

Procedure

Subjects was randomly assigned to 1 of the 2 intervention groups: Group A: Mckenzie with TENS group (n=50) and Group B: Neural mobilization with TENS group (n=50).

Group A participants were received treatment of TENS for 30 minutes following Mckenzie technique. Group B participants were received treatment of TENS for 30 minutes followed by neural mobilization technique. Both the group were received 8 sessions of therapy at one session per day. Prior to the manual therapy techniques TENS was given for 30 min 1 session/day.

2.7 Intervention

Group A: Mckenzie Technique: The participant lies on abdomen on the treatment couch. The goal is to produce centralization of symptoms. The activity is a sagital extension forces rapidly progressing through to patient overpressure to gain full range. Extension exercises will be progressed as tolerated, starting with static prone positioning, if any symptoms are recorded. Next stage is lying prone in extension (prone on elbow). The next progression is extension in lying (prone on hands with elbow extension). Last step is extension

in lying with patient overpressure. In this stage the patient sags her/his hips and breaths out fully to gain maximal extension to complete the reductive process. A subject who tolerates the complete exercise program will perform 3 sets of 10 repetitions of repeated end range extension in prone position.

Fig 1: Static Prone Position

Fig 2: Prone On Elbow

Fig 3: Prone On Hands

Fig 4: Extension lying with overpressure

Group B: Neural Mobilisation Technique: The participants will be in supine lying and the leg will be lifted upwards as a solid lever, while maintaining the knee extension. The leg will be raised past 35^0 in order to take up the slake in the nerve. Sciatica nerve is completely stretched at 70^0. For additional sensitization hip adduction was added to straight leg rising the intervention consists of gentle short duration (1 second) and large amplitude passive movements are performed at 'feather edge' of patient's neural symptoms in on/off fashion. A mild degree of discomfort is permitted during 'on' phase which must be completely abated when the tension is withdrawn (off phase). 30 seconds of on/off mobilization of 3 repetitions will be performed.

Fig 5: Neural Mobilization Technique

Transcutaneous electrical nerve stimulation (TENS)
TENS unit stimulates peripheral nerves via skin surface electrodes at well-tolerated intensities. TENS delivers thelow frequency current through superficial electrodes placed on the skin around the affected area whichinduce a tingling sensation and disrupt the pain signal in the surrounding nerves. A dual channel TENS unit will be used. One channel is placed paraspinally at the level of origin of the sciatica nerve (L4, L5, S1, S2 and S3) and a second channel at the site of referred pain (eg. Posterior thigh), calf muscle or thigh. The machine Acupunture-Like TENS (AL-TENS) will be used. At low frequency (5-10Hz), for a duration of 30 minutes. TENS isused to induce muscle relaxation and tetanic contractions which inturn reduce the pain.

Fig 6: Placement of TENS

2.8 Outcome measures: The outcomes were assessed pre intervention on day 1 and post intervention on day 8. VAS (visual analogue scale) was used to measure pain. ROM (range of motion) was measured using Schober's method. Disability score was measured by using Modified Oswestry Disability Questionnaire.

3. Results and Discussion

3.1 Data Analysis

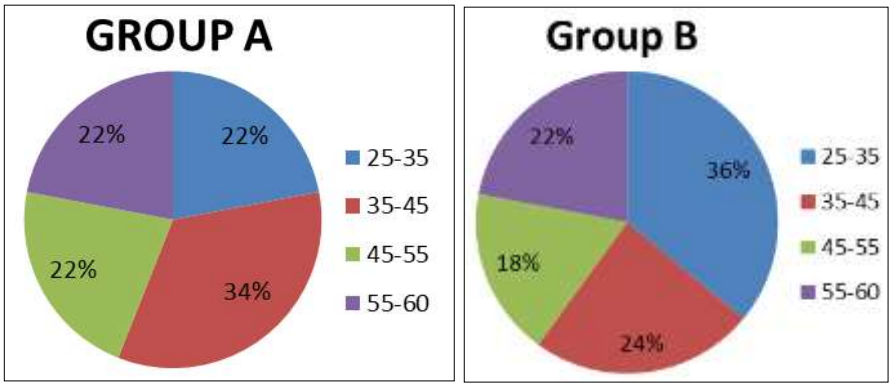
Statistical analysis was performed using SPSS software version 20.0. Descriptive statistics was done by calculating Mean, Std Deviation and Std error. Normality test for homegenity of variance was done using Shapiro Wilkinson test. As the data set is on continuous scale and also follows normal distribution parametric tests were planned for the analysis. Significance level was kept at 5%.

The continuous scale dependent variable was assessed between the group and within the group for statistical difference. Inferential statistics was performed by Student- t test (unpaired t-test, two tailed) to compare the difference between pre treatment and post treatment. Within the group comparison was done using paired –t test (two tailed)

Table 1: Age Distribution of Subjects.

Age	Group A		Group B	
	Frequence	Percentage	Frequence	Percentage
25-35	11	22	18	36
35-45	17	34	12	24
45-55	11	22	9	18
55-60	11	22	11	22
Total	50	100	50	100
Mean & SD	44.18±11.15		41.32±12.16	

The above graph shows the age distribution of subjects taken for this study as follows:- in this table there were 11 (22%) subjectsin group A and 18 (36%) subjects in group B with their age group between 25 to 35 years. The age group between 35 to 45 years has 17 (34%) subjects in group A and 12 (24%) subjects in group B. And between the age group 45 to 55 years has 11 (22%) subjects in group A and 9 (18%) subjects in group B. the age group between 55-60 years has 11 (22%) subjects in group A and 11 (22%) subjects in group B with the mean and standard difference of 44.18±11.15 in group A and 41.32±12.16 in group B.

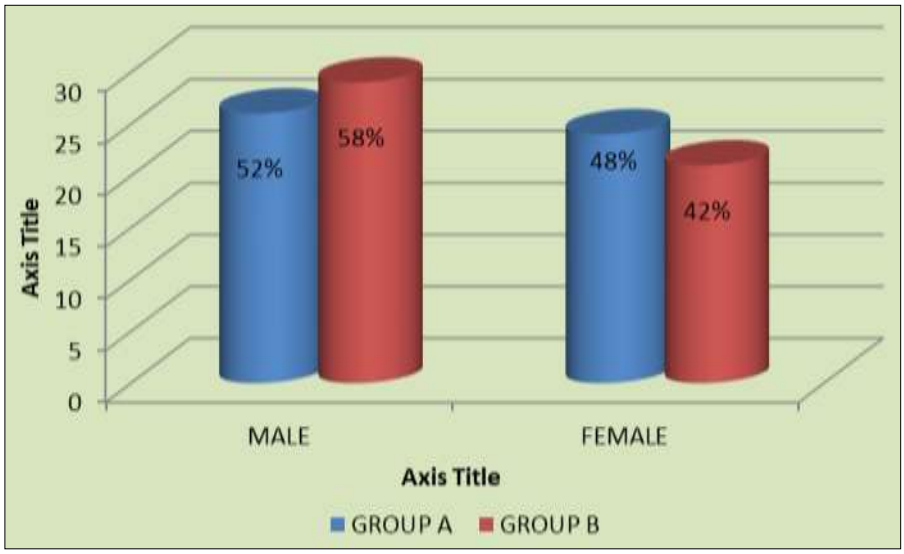


Graph 1: Percentage of Age Distribution of Group-A and Group-B

Table 2: Gender distribution of subject

Gender	Group A		Group B	
	Frequency	Percentage	Frequency	Percentage
Male	26	52	29	58
Female	24	48	21	42
Total	50	100	50	100

The above graph shows the gender distribution of subjects taken for this study as follows:- In this table, 50(100%) subjects in Group A consists of 26 number of male subjects (52%) and 24 number of female subjects (48%) and 50(100%) subjects in Group B consists of 29 number of male subjects (58%) and 21 number of female subjects.



Graph 2: Percentage of Gender Distribution of Group-A and Group-B

Table 3: Between Group Comparison VAS Scale

	Pre (Mean &Sd)	Post (Mean &Sd)	Difference	P Value (Unpaired T Test)
Group A	6.36±1.826	2.06±1.621	4.3±1.139	0.001*
Group B	6.88±1.56	3.24±1.756	3.64±1.191	0.001*
P Value (Unpaired T Test)	0.1283	0.007*		

P<0.05 is significant.

The above graph shows the comparison of descriptive values before and after the experiment between the group A and group B. In group A the pre test(6.36±1.826) and in post test shows significant reduced to (2.06±1.621). In group B the pre test(6.88±1.56) and in post test shows significant reduced to (3.24±1.756). The result shows mean difference of group A (4.3±1.139) and group B (3.64±1.191). Statistical significance was observed between the groups (p<0.005)

Table 4: Between the group comparison-rom-flexion

	Pre (Mean &Sd)	Post (Mean &Sd)	Difference	P Value (Unpaired T Test)
Group A	4.12±1.673	5.9±1.446	-1.8±0.728	**0.001***
Group B	3.7±1.749	4.74±1.588	-1.54±0.542	**0.001***
P Value (Unpaired T Test)	0.0737	0.001*		

P<0.05 is significant.

The above table shows the comparative evaluation for 100 subjects randomized in to two groups with 50 in Group A and 50 in Group B for lumbar radiculopathy by using lumbar spine ROM. The mean and standard deviationwith 50 subjects in Group A, in pre test (4.12±1.673), the mean and standard deviation in post test of the lumbar spine Range Of Motion (flexion) is significantly increased to (5.9±1.446).

The mean and standard deviation with 50 subjects in Group B, in pre test (3.7±1.749), the mean and standard deviation in post test of lumbar spine Range Of Motion (flexion) is significantly increased to (4.74±1.588)

Table 5: Between the group comparison-ROM-extension

	Pre (Mean &Sd)	Post (Mean &Sd)	Difference	P Value (Unpaired T Test)
Group A	2.28±1.03	4.38±1.12	-2.1±0.735	0.0001*
Group B	2.02±1.02	3.76±1.318	-1.176±0.796	0.0001*
P Value (Unpaired T Test)	0.201	0.012*		

P<0.05 is significant.

The above the table shows the comparative evaluation for 100 subjects randomized in two groups with 50 in Group A and 50 in Group B for lumbar radiculopathy by using lumbar spine Range Of Motion. Themean and standard deviation with 50 subjects in Group A, in the pre test (2.28±1.03), and the mean and standard deviation in post test (extension) is significantly increased to (4.38±1.12). The mean and standard deviation with 50 subjects in Group B, in the pre test (2.02±1.02) and the mean and standard deviation in post test (extension) is significantly increased to (3.76±1.318).

Table 6: Between the group comparison-Modi

	Pre (Mean &Sd)	Post (Mean &Sd)	Difference	P Value (Unpaired T Test)
Group A	46.06±13.27	30.56±12.185	15.5±6.609	0.0001*
Group B	46.9±12.32	35.86±12.30	12.08±7.09	0.0001*
P Value(Unpaired T Test)	0.737	0.032*		

P<0.05 is significant

The above table shows comparative evaluation for 100 subjects randomized in two groups with 50 in Group A and 50 in Group B for lumbar radiculopathy by using MODI score. The mean and standard deviation with 50 subjects in Group A, in the pre test (46.06±13.27), and the post test MODI score is significantly reduced to (30.56±12.185).

The mean and standard deviation with 50 subjects in Group B, in the pre test (46.9±12.32), and the post test MODI score is significantly reduced to (35.86±12.30)

4. Discussion

The result from the statistical analysis of the present study showed that along with Mckenzie technique with TENS versus Neural monilization with TENS is effective in relieving pain, improving functional disability and increase in lumbar ROM.

The study comprising of 100 subjects with chronic low back pain with radiculopathy were selected the age group from 25-60 years and divided into group A and group B respectively, each consisting of 50 subjects.

Group A, TENS with Mckenzie exercise consisting of 50 subjects, in which 26 male and 24 female. Group B TENS with Neural mobilization consisting of 50 subjects, in which 29 male and 21 female are present.

There were 11 (22%) subjects in group A and 18 (36%) subjects in group B with their age group between 25 to 35 years. The age group between 35 to 45 years has 17 (34%) subjects in group A and 12 (24%) subjects in group B. And between the age group 45 to 55 years has 11 (22%) subjects in group A and 9 (18%) subjects in group B. the age group between 55-60 years has 11 (22%) subjects in group A and 11 (22%) subjects in group B.

The treatment assessment was taken by using the following outcome measures- VAS, MMST, MODI. According to the results obtained by VAS, MMST, MODI the changes in pre test to post test showed there is improvement in both the groups. Following the statistical analysis, Mckenzie with TENS showed greater recovery than Neural Mobilization with

TENS.

Within the group comparison showed significant reduction in VAS scores. In group A the pre test was 6.38±1.826 and was decreased to 2.06±1.621 at the end of 8 session. In group B the pre test was 6.88±1.56 and was decreased to 3.24±1.756 at the end of 8 session, based on the mean difference change in VAS, group A (4.3±1.139) and group B (3.64±1.191) is significant, but between the group analyses showed TENS with Mckenzie technique is more reduction in pain.

Within the group comparison showed significant increase in spinal flexion ROM. In group A the pre test was 4.12±1.073 and was increased to 5.9±1.446 at the end of 8 session. In group B the pre test was 3.7±1.749 and was increased to 4.74±1.588 at the end of 8 session, based on the mean difference change in ROM flexion, group A (-1.8±0.728) and group B (-1.54±0.542) is significant, but between the group analyses showed Mckenzie technique is more effective in increasing flexion ROM.

Within the group comparison showed significant increase in spinal extension ROM. In group A the pre test was 2.28±1.03 and was increased to 4.38±1.2 at the end of 8 session. In group B the pre test was 2.02±1.02 and was increased to 3.76±3.18 at the end of 8 session, based on the mean difference change in ROM extension, group A (-2.1±0.735) and group B (-1.176±0.796) is significant, but between the group analyses showed Mckenzie technique is more effective in increasing extension ROM.

Within groups comparison showed significant reduction in MODI scores. In group A the pre test was 46.06±13.27 and was decreased to 30.56±12.185 at the end of the 8 session. In group B the pre test was 46.9±12.32 and was decreased to 35.86±12.30 at the end of 8 session, based on the mean difference change in MODI, group A (15.5±6.609) and group B (12.08±7.09) is significant, but between the group analyses showed Mckenzie technique is more reduction in disability index.

5. Conclusion

This study was conducted to assess and compare the effectiveness of TENS with Mckenzie and TENS with Neural mobilization in subjects with chronic low back pain with radiculopathy. The subject of both the groups showed improvement in their VAS, MMST, MODI but, Group A showed statistically more improvement when compared with group B with the P value <0.05 and the results of this study showed that along with TENS and Mckenzie technique is significant in decreasing pain, improving functional ability and increasing spinal range of motion in chronic low back pain with radiculopathy.

6. References

1. Yaseer Aneis M, Islam Al-Azab M. Impact of exercise approach on patients with chronic low back pain with radiculopathy Mckenzie extension: A randomized controlled trail. International journal of therapies & rehabilitation research 2017; 6(2):29-36.
2. Patel AT, Ogle AA. https://en.wikipedia.org/wiki/Back-pain. (Accessed on 05/03/2017).
3. Anand Heggannavar, Lopa Das. Effect of Mckenzie technique versus neural mobilization in chronic low back with radiculopathy-A randomized clinical trial. Indian Journal of Physical therapy 2015;3(1):33-37.
4. Andrew Tarulli W, Elizabeth Raynor M. Lumbosacral radiculopathy. Neurol clin 2007;25:387-405.
5. Arti Sharma, Khalid Alahmari, Irshad Ahmed. Efficacy of manual therapy versus conventional physical therapy in chronic low back pain due to lumbar spondylosis. A pilot study. Medical sciences 2015;3:55-63.
6. Amole Khadilkar, Sarah Milne, Lucie Brosseau, *et al*. transcutaneous electrical nerve stimulation for the treatment of chronic low bach pain: A Systematic Review. Researchgate 2005;30(23):2657-2666.
7. Mohamed Taher Mahmoud, Desoky EL, Enas Elsayed Mohamed Abutaleb. Efficacy of neural mobilization on low back pain with S1 radiculopathy. IJPHY 2016;3(3):362-370.
8. Ronald Melzac, Phyllis Vetere, Lois Finch. Transcutaneous electrical nerve stimulation for low back pain a comparison of TENS and Massage for pain and range of motion. APTA 1983;63(4):489-493.
9. Anetta Cubala, Jaroslaw Hoffman, Wojciech Hagner, *et al*. Effect of Mckenzie method on the severity and location of pain in patients with lumbo-sacral discopathy. Medical and biological science 2012;26(4):65-70.
10. Gladson Bertolini RF, Taciane Silva S, Danilo Trindade L, Adriano Ciena P, Alberito Carvalho R. Neural mobilization and static stretching in an experimental sciatica model- an experimental study. Rev Bras Fisioter 2009;13(6):493-8.