

[PILOT STUDY]**Effectiveness of Kinetic Control Versus Mckenzie Exercises on Functional Outcomes in Patients with Lumbar Radiculopathy – A Single Blinded Randomized Pilot Study.**Joshi Kanchan¹, Anap Deepak²,¹Post graduate student, ²Prof. & HOD, Dept. Musculoskeletal physiotherapy, DVVVPF'S COPT, Ahilyanagar.**ABSTRACT**

Background: The term lumbar radiculopathy (LR) is a condition caused by compression and/or irritation of lumbar nerve roots by intervertebral disk degeneration or herniation, degenerative arthritis, lumbar stenosis, and other conditions like bone or muscle tumors, infections, or inflammation.^{1,2} Physical therapy techniques to treat lumbar radiculopathy includes, Neural tissue mobilization exercises, Stabilization, Kinetic control exercises for lumbar spine, manipulation technique, Direction based Mckenzie exercises along with conventional physiotherapy. There is a lack of literature on effectiveness of kinetic control and Mckenzie exercises in patients with Lumbar Radiculopathy. Hence this study is conducted to find out which treatment will be more effective.

Methodology: Study was conducted among 8 individuals of age 25-45 years having Lumbar Radiculopathy who were divided into two groups. 4 individuals of group A received Motor Control Exercises and 4 of group B received Mckenzie Exercises. Pain, Range of Motion of Lumbar Spine, Strength of Trunk muscles and Back Disability were assessed pre-intervention and immediate post-intervention.

Result: A significant difference was found in both the groups for Pain ($p=0.0319$), Disability ($p=0.018$) & Flexion Range of motion of lumbar spine ($p=0.002$) except all other Range of motion & strength of trunk muscles ($p=0.2070$). When comparison was done after 4 weeks the percentage of improvement in group A was much higher than group B.

Conclusion: Kinetic control exercises showed significant improvement in reducing pain, disability and improving lumbar spine flexion range of motion when compared to McKenzie while there is no any difference in extension, lateral flexion range of motion and strength of trunk muscles.

Keywords: Lumbar Radiculopathy, Mckenzie exercises, Motor control exercises, Functional outcomes.

Introduction

The term lumbar radiculopathy (LR) describes a pain syndrome caused by compression and/or irritation of lumbar nerve roots by intervertebral disk degeneration or herniation, degenerative arthritis, lumbar stenosis, and other conditions like bone or muscle tumors, infections, or inflammation.^[1,2] The incidence of low back pain is estimated to be between 13% and 31%, with radicular symptoms in patients presenting with low back pain ranging from 12% to 40%.^[13]

“Sciatica,” “leg pain,” and “lumbar radicular

syndrome” are often used as synonyms. Radiating pain with dermatomal distribution, numbness/tingling, weakness with myotomal distribution & impaired deep tendon reflexes are the common presenting symptoms and signs of LR depending on the nerve root(s) affected.³ Radiculopathy may also be accompanied by radicular pain.⁴ has a global prevalence up to 10.2 % and the lifetime prevalence LBP with leg pain ranges up to 43% which has the unfavorable recovery.^[5] Pain symptoms can be managed with medications such as NSAIDs, acetaminophen, and, in severe cases, opiates. Neuroleptic agents are commonly used to

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treat radicular symptoms. Systemic steroids are frequently prescribed for acute low back pain, despite the fact that there is little evidence to support their effectiveness. Nonpharmacologic interventions are often utilized as well. Lumbosacral radiculopathy is commonly treated with physical therapy, acupuncture, chiropractic manipulation, and traction. It is worth noting that the evidence supporting the use of these treatment options is ambiguous. Epidural steroid injections and percutaneous disc decompression are two commonly used interventional techniques. In refractory cases, surgical decompression and spinal fusion can be done.^[10,11 12]

The kinetic control comprises balanced presentation of the movement choices with ideal interaction among the key components for the sensorimotor neuromuscular control that mediated by afferent sensory input, particularly the proprioceptive input, CNS integration, optimal motor coordination, and physiological stresses to assure functional dynamic stability and controlled mobility^[6,7] Regarding the Kinetic Control retraining, the movement coordination tests involved were flexion coordination tests, tests for uncontrolled extension and rotation/side bending movement control tests. This uncontrolled movement may be segmental hinge at one level or multi segmented hypermobility^[17,23]. The Kinetic Control retraining strategy consists of patient education about his/her uncontrolled movement, retraining the coordination of movement direction control and muscle synergy retraining.. Any problem in one or more of those systems results in pain, dysfunction and compromised life activities^[15]. Reduction of functional lumbar mobility and returning to daily living activities occur as a result of chronic LBP. Kinetic control training in combination with lumbar stabilization exercises was found to improve the functional lumbar mobility and the return to perform the daily living activities in patients with chronic LBP^[16]. There is also little literature with no clear results about the effect of kinetic control retraining on the LBP and radiculopathy.^[17,18]

When the subject understood the movement or action, the subject is obliged to do the movement without feed backing McKenzie extension exercises mainly use for managing pain in the patients suffering from low back pain cause by any musculoskeletal or neuromuscular derangements.⁸

Basically three main principles of McKenzie used clinically to treat the symptoms which depends upon the pathology that whether it is flexion biased or extension biased. Flexion Biased treat with extension principle while extension biased treat with flexion principle.^[9]

As per my knowledge and search there is lack of literature on effectiveness of kinetic control and Mckenzie exercises in patients with lumbar radiculopathy. Many researchers done the study on other body parts such as neck, Shoulder and lumbar spine which shows effectiveness of kinetic control exercises, also the effectiveness of Mckenzie exercises is proved in cervical spine but the comparative study between kinetic control exercises and Mckenzie exercises is lacking, Hence this study is conducted to find out the which treatment will be more effective.

Methodology

It was a single blinded randomized pilot study. Randomization of the participants in two groups was done using a computer-generated randomization method. The purposive sampling method was used to conduct the study; the present study was conducted among patients with Lumbar Radiculopathy admitted in I.P.D and Musculoskeletal Physiotherapy O.P.D at tertiary care Hospital. Written and verbal informed consent was taken from all the participants.^[8] Participants of age 25-45 years having Lumbar Radiculopathy were divided into two groups of 4 individuals each and were given a single intervention of Motor Control Exercises, directional biased Mckenzie Exercises respectively. Pain, Range of Motion of Lumbar Spine, Strength of Trunk muscles and Back Disability were assessed pre-intervention and immediate post-intervention. The data was collected and analyzed.

Procedure

Ethical Committee approval was obtained from IEC prior to beginning the study. Screening was done as per inclusion and exclusion criteria. The data collection sheet and consent form was filled by patients. An orientation was given regarding the purpose, procedure and benefits of the study to the patients. 8 samples were recruited for the study. Demographic data of the participants, including name, age, gender, occupation, and any history of systemic disease and medications, was documented. Assessment of the participants was done by using the following outcome measures such as Pain was

assessed by VAS, back disability was assessed by MODI Questionnaire, ROM of lumbar spine by using inclinometer & strength of trunk muscles was assessed by MMT. All outcome measures were evaluated at baseline and after the 4th week of intervention program.

Intervention

Group A: Kinetic Control Exercises

Group B: McKenzie Exercises.

4 participants of Group A received Kinetic Control Exercises and 4 participants of Group B received directional biased Mckenzie exercises for 4 weeks. Intervention given thrice a week upto 4 weeks. The participants were selected on the basis of inclusion and exclusion criteria. 4 patients in each group, included in the study were both male and female of age group between 25-45 years, symptomatic patients with lumbar radiculopathy and patients who were willing to participate and signed a consent form. Participants excluded from the study were Females with Gynecological problems that may cause low back pain, Patients with a previous spinal surgery, other radicular symptoms causes (e.g: piriformis syndrome, diabetic neuropathy).

Abdominal Draw In Manuever



Fig 1: Intervention Group A: Kinetic Control Exercises.



a) ADIM With heel slide (each leg)



b) ADIM With heel slide (each leg)

Fig 2: Intervention Group B: Mckenzie Exercises.



a) Prone on elbows



b) Prone on hands



c) Double knee to chest



d) Standing forward bend

Statistical Analysis

The data analysis was performed with GraphPad InStat 3.06 and IBM SPSS version 24. The mean and standard deviations for outcome measures were determined using descriptive statistical analysis. To maintain group uniformity, both groups' baseline characteristics were compared. Between group data analysis was done using the Unpaired t test.

Result

Study was conducted among total 08 Participants with lumbar radiculopathy, 4 Participants in Group A and 4 Participants in Group B were assessed.

Table 1: Distribution of Mean Age.

Subject Age	N	Mean ± SD
Total	08	41.62±3.204
Group A	04	39.5±3.109
Group B	04	43.7±1.500

Table no. 2: Between group data analysis of Visual Analogue Scale for Pain.

VAS	Post Group A	Post Group B	P Value	t Value	Result
Mean ± SD	3.75±0.95	2.0±0.81	0.0319	2.782	Significant

Table no. 3: Between group data analysis of MODI for Disability.

MODI	Post Group A	Post Group B	P Value	t Value	Result
Mean± SD	35.75±13.37	27.5±11.90	0.0181	4.714	Significant

Table no. 4: Between group data analysis of Lumbar Range Of Motion.

Lumbar ROM	PostGroup A	PostGroup B	P Value	t Value	Result
	Mean±SD	Mean±SD			
Flexion	49.25±4.34	56.25±2.98	0.0022	9.899	Significant
Extension	21±3.16	21.75±2.98	0.2152	1.567	Not Significant
Rt L. Flexion	19.5±3.109	20.5±3.87	0.2152	1.567	Not Significant
Lt. L Flexion	17.79 ± 3.18	18.60±3.20	332.50	0.1699	Not Significant

Table no. 5: Between group data analysis of Strength.

Strength	PostGroup A	PostGroup B	P Value	t Value	Result
	Mean±SD	Mean±SD			
Trunk Flexors	4.25±0.50	4.0±0.81	0.0577	3.00	Not Significant
Trunk Extensors	4.75±0.51	3.25±0.50	0.0917	2.449	Not Significant

Unpaired t test was used to calculate difference between the groups. A significant difference was found in both the groups for Pain (p=0.0319), Disability(p=0.018) & Flexion Range of motion of lumbar spine(p=0.002) except all other ROM & strength of trunk muscles(p=0.2070). It shows statistically significant difference between the groups.

Interpretation of the result is, Group A shows better improvement in reducing pain and disability along with improvement in trunk flexion ROM as compared to Mckenzie exercises.

Discussion

The present study was carried out to compare and

find out the effectiveness of motor control exercise versus McKenzie exercise in lumbar radiculopathy patients.

The results of the study showed that pain and disability decreased in both the groups. But disability was significantly decreased in the motor control exercise group. The findings are consistent with previous research in terms of pain and function improvement after performing motor control exercises. There was a significant change in pain and disability in the motor control exercise group for a variety of reasons, including motor control training changing trunk muscle behavior during functional tasks. The mechanism includes reduced load and

improved movement quality.^[13] This approach focuses on the deep stabilizing muscles of the lower back, including the multifidus, transverse abdominis, and pelvic floor. These are especially dysfunctional after experiencing back pain. As a result, treating back pain requires addressing the function and dysfunction of these local muscles. Reprogramming the brain for optimal stabilization targets the appropriate muscle for the task at hand^[14]. However, proper muscle recruitment and timing are necessary for the management of spine balance and mechanical stability. Some low back diseases and chronic back pain have been linked to muscle dysfunction and motor control faults in maintaining spine stability.

Group B received McKenzie exercises. Given the aforementioned considerations, the McKenzie group's decreased discomfort may have resulted from other factors other than modifications to the thickness of the MF and abdominal muscles in the motor control group.

The findings of present study was supported by the research done by author Peterson T. et al. titled "One year follow up comparison of the effectiveness of McKenzie treatment and strengthening training for patients with chronic low back pain: outcome and prognostic factors" and study revealed that this approach was focused on sustained postures or repeated movements, and pain reduction might have been due to postural correction.^[26] The study's intervention's duration and intensity were also significant factors. The intervention lasted for four weeks and was given for thirty to forty-five minutes on different days of the week. Usually, intense strengthening exercises lasting 8 to 12 weeks result in muscle hypertrophy. Therefore, we hypothesized that the short research period and the impact of neuromuscular adaptation caused some of the results to shift.^[27,28]

According to this study both the groups Group A i.e Motor control exercises and Group B i.e McKenzie exercises showed significant improvement in VAS, and ODI. But in comparison between the groups, the MCE group showed more improvement as compared to McKenzie exercises in above parameters.

Conclusion

Kinetic control exercises show statistically and clinically significant improvement in reducing pain, disability and improving lumbar spine flexion range of motion when compared to McKenzie while there

is no any difference in extension, lateral flexion range of motion and strength of trunk muscles.

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Conflict of Interest

Authors asserted no conflict of interest.

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