

# Effectiveness of Mckenzie and Core Strengthening Exercise in a Patient with Chronic Low Back Pain: A Case Study

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## ABSTRACT

Low back pain is a pain that is caused by stiffness of muscle below the costal margin, degeneration of the disc, with or without leg pain (sciatica). The most important symptoms of non-specific low back pain are pain and disability. This study investigates the effectiveness of McKenzie and Core strengthening exercise in a patient with chronic low back pain. 24-year-old male patient presented to outpatient department with low back pain radiating to left leg and difficulty in standing and walking. The patient underwent 2 weeks of rehabilitation, attending 30 minutes of physiotherapy treatment for 6 sessions per week. The Oswestry disability index scale score reduced from moderate to minimal disability and pain score reduced from moderate to no pain. After the intervention, the patient pain completely reduced and patient was able to stand and walk for 1 hour without pain. This study concluded that the McKenzie and Core strengthening exercises can be recommended in reducing pain intensity, functional disability and improving quality of life in a patient with chronic non-specific low back pain. Further studies are required to understand the long-term effect of McKenzie and core strengthening exercises in different age group patients.

**Keywords:** McKenzie exercise, Chronic low back pain, Core strengthening exercise

## 1. INTRODUCTION

Low back pain (LBP) is considered as one of the widespread problems, in which pain felt in the lumbosacral, spinal and paraspinal regions which encompass the buttocks and upper thigh<sup>1</sup>. LBP is the leading cause of disability worldwide<sup>2</sup>. The estimated prevalence of LBP is significant, with point prevalence ranging from 21% -33% and 22% - 65% for one-year prevalence and a lifetime prevalence as high as 84% globally<sup>1</sup>. The chronic low back pain (CLBP) is defined by a duration of more than 12 weeks and it lasts longer than the expected time of healing. Non-specific chronic low back pain (NSCLBP), accounting for approximately 85% of all back pain cases. This condition not only causes pain but also significantly impairs daily life activities such as walking and dressing up<sup>3</sup>. NSLBP is a complex and multifaceted condition that cannot be attributed to a single underlying pathology or symptom pattern. Rather, it emerges from the interplay of various risk factors, encompassing individual characteristics, workplace influences, behavioural and environmental elements, and psychosocial components, which collectively contribute to its development.<sup>4</sup>

The McKenzie Method of Mechanical Diagnostic Therapy (MDT) approaches was pioneered by New Zealand Physical Therapist Robin McKenzie in the 1950s, to treat back and extremity issues. This method categorizes the underlying causes of LBP into three distinct syndromes: postural syndrome, dysfunction syndrome, and derangement syndrome. Derangement syndrome, the most common diagnosis, where a mechanical obstruction interferes with movement, causing pain<sup>5</sup>. Research within the McKenzie classification system has validated the importance of two key pain-pattern classification criteria - centralization and directional preference - in predicting patient outcomes and distinguishing between different conditions. As a result, a pain-pattern classification approach based on these two criteria has emerged, providing physical therapists with a valuable tool to inform their clinical decision-making and guide effective patient management in daily practice<sup>6</sup>.

The core is a muscular structure comprising the abdominals at the front, paraspinals and gluteal at the back, the diaphragm as the upper boundary, and the pelvic floor and hip girdle musculature as the lower foundation<sup>7</sup>. Core stability refers to the ability of these muscles to maintain lumbar spine and pelvic girdle stability during both static positions and dynamic movements<sup>4</sup>. The core muscles are categorized into two groups based on their functions and characteristics: Deep core muscles (local stabilizers): transversus abdominis, lumbar multifidus, internal oblique, and quadratus lumborum. Notably, the lumbar multifidus muscle attaches directly to each lumbar vertebra, and it, along with the transversus abdominis, engages in a co-contraction mechanism. Shallow core muscles (global stabilizers): rectus abdominis, internal and external oblique muscles, erector spinae, quadratus lumborum, and hip muscle groups.<sup>8</sup> This study aims to evaluate the effectiveness of McKenzie and core strengthening exercise in patient with chronic low back pain.

## **2. LITERATURE REVIEW**

1. Jyothi Sharma et al [2018] Conducted a study on the comparison of the effects of core strengthening exercise and McKenzie extension exercise on the pain functional disability in lumbar PIVD condition. 30 subjects were selected and divided into 2 groups randomly. The Group A subject received McKenzie extension exercise; the group B subject received Core strengthening exercise. Both the group were treated for 2 weeks. The patients were treated for 6 sessions on a week. The Results of this study showed that McKenzie extension exercise protocol was more effective in comparison to core strengthening in low back pain with PIVD condition. [DOI: <http://dx.doi.org/10.21088/potj.0974.577.7.11218.4>]
2. Olivier et al [2018] Conducted a study on effectiveness of the McKenzie method of mechanical diagnosis and therapy for treating LBP: literature review with meta-analysis; They are concluded that there is moderate- to high- quality evidence that MDT is not superior to other rehabilitation interventions for reducing pain and disability in patients with acute LBP. In patients with chronic LBP, there is moderate- to high-quality evidence that MDT is superior to other rehabilitation interventions for reducing pain and disability.
3. Joseph Aubrey Comerford [2023] Conducted a study on core Stabilization Exercises for managing non-specific low back pain in adults: a narrative review of their efficacy alone or with multidisciplinary approaches. A structured search of relevant articles was performed where they got a total of 608 articles. 22 articles met the inclusion criteria, and 586 articles were excluded. The result of the study says that Core stability exercises should be used as part of a comprehensive treatment approach for non-specific low back pain (NSLBP), combined with other modalities such as therapeutic exercise and allied health

conservative treatment plans. When used in conjunction with other modalities in a multidisciplinary approach, these treatments have demonstrated significant improvements in both pain levels and functional status.

4. Anas et al [2019] Conducted a systemic review on Effects of McKenzie and stabilization exercises in reducing pain intensity and functional disability in individuals with nonspecific chronic low back pain, a total of 10 articles were selected for this review from that only 2 studies compared stabilization and McKenzie exercises in the management of CNLBP. Therefore, insufficient evidence is available to draw any conclusive comparison on the effects of McKenzie and stabilization exercises in chronic nonspecific low back pain.
5. Sylvia Meyer et al [2018] Conducted a study on McKenzie Method and treatment of low back pain. they concluded that Patients perceived better function, decreased both pain and disability when utilizing MDT. While statistical significance was present in some outcomes, the clinical significance was found to be low. One benefit, illustrated in two of the studies, is patient's perception of their LBP improving with MDT as demonstrated by global perceived effect. In most instances, acute episode of LBP will self-resolve with or without an intervention.
6. Ashiyat Kehinde et al [2020] Conducted a study on effects of core stabilization and McKenzie back extension exercises on pain, disability and insomnia in patients with non-specific chronic low back pain. In this study 41(16 males, 25 females) participants participated and they are divided into 3 groups. Group 1 received core stabilization exercises, Group 2 received McKenzie back exercises and Group 3 received TENS and back care education. At the end of 4<sup>th</sup> week both core stabilization and McKenzie back extension exercise group

had improved outcomes following intervention.

7. M B Dohnert et al [2020] Conducted a Blind Randomized clinical trial on lumbopelvic stabilization exercises and McKenzie method in low back pain due to disc protrusion. In this study 69 patients allocated into the core Group (CG), the McKenzie Group (MG), or the core + McKenzie group (CMG). All groups underwent 3 interventions per week for 4 weeks, totalling 12 sessions. The result of this study says that both exercise methods were efficient in reducing pain and improving function in patients with low back pain due to disc protrusion. However, the groups that used stabilization exercises showed better results in activating lumbopelvic stabilizing muscles.

## **MATERIALS AND METHOD**

### **Intervention:**

Movement loss, Straight leg raise, outcome measure and changes in the impairment were documented in a treatment period of 2 weeks. The patient received daily education regarding postural correction, intervention strategies and home exercises. The physiotherapist had the opportunity to discuss and explain the patient also but the progress, limitations, and plans.

### **Procedural interventions:**

The patient was scheduled for physiotherapy daily for 30 minutes sessions on weekdays during this rehabilitation. The patient attended the session daily for 6 days per week for 2 weeks. Patient was advised to do home exercise program once daily and McKenzie exercises 5 times / day. The short-term goals were to reduce pain and improve ROM of lumbar spine, and long-term goals were to improve core muscle strength and ADL activities. The intervention plan and care focused primarily on reducing pain and improving function.

### Techniques of application

Before starting the exercises

- Movement loss, SLR, pain score is checked
- Patient is advised to wear loose cloths.
- Mainly Two types of Exercises
- McKenzie exercises
- Core strengthening exercises

### McKenzie exercise

First McKenzie exercises is given 10 repetitions of 1 set and pain score is checked after the session. Ask the patient to lie on a mat or bed on his stomach and straighten his/her legs and place the elbows on the ground and slide the shoulders down. Lift the upper back, pressing the hips into the mat or bed.



Figure: 1 Extension in lying



Figure 2: Abdominal bracing



Figure 3: Bracing during heel slides in supine



Figure 4: Bracing during bridging



Figure 5: Bracing during bridging and leg lift



Figure 6: Quadrupedal arm lift with bracing



Figure 7: Quadrupedal alternate arm and leg lift with bracing

### 3. RESULTS

The patient reported an overall improvement in NPRS and ODI. Physiotherapy session was done for 2 Consecutive week and there was indeed a good prognosis in pain and function of patient in 2 weeks.

Scale	Pre-data	Post-data
NPRS	4/10	0/10
ODI	35.5%	4.4%

#### Post treatment assessment:

##### Pain:

- According to NPRS scale the patient scored 0/10 pain on movement.
- Patient's pain was improved from moderate (4/10) to nil (0/10).

##### Oswestry disability index (ODI):

- According to ODI scale the total score is 2/45 means (4.4%), Thus the ODI reduced to lower grade on treatment.
- The LBP disability belongs to minimal disability (0% to 20%).

### 4. DISCUSSION

The study aimed at assessing the effectiveness of McKenzie and core strengthening exercises in a patient with chronic low back pain. The result of the study is based on single case study. The data were collected based on ODI questionnaire and NPRS scale. Experimental study design intended to assess the effectiveness of McKenzie and core strengthening exercises in a 24-year-old adult male patient.

In this study, NPRS scale was used to assess the low back pain. After assessing the pain,

extension in lying and core strengthening exercises were given of 10 repetitions of 1 and 2 set respectively at 30 minutes duration for 2 weeks. NPRS scale was used to assess the pain level of low back pain after doing the exercises, the result implies that there was much significant difference in the pain after the session.

LBP of my patient was assessed by NPRS scale and ODI scale. In NPRS scale result shows that the pretest score was 4/10 and post test score was 0/10 and the result in ODI shows that the pretest score of experimental groups was 16/45 (35.5%) and post test score was 2/45 (4.4%). It showed that there was a significant difference exist between the pre-test and post-test, it implies that there was a significant reduction in the intensity of pain after providing the exercises.

In this study, McKenzie and core strengthening exercise had a positive effect on pain, reduce the functional disability and increase the quality of life. A study was done by Olivier et al [2018] conducted a literature review with meta-analysis on effectiveness of the McKenzie method of mechanical diagnosis and therapy for treating LBP, they concluded that there is moderate- to high-quality evidence that MDT is not superior to other rehabilitation interventions for reducing pain and disability in patients with acute LBP. In patients with chronic LBP, there is moderate- to high-quality evidence that MDT is superior to other rehabilitation interventions for reducing pain and disability. Therefore, McKenzie and core strengthening exercises can be used to treat primarily for

patient with chronic non-specific low back pain. Another study was conducted by Jyothi Sharma et al [2018] about the study on comparison of the effects of core strengthening exercise and McKenzie extension exercise on the pain functional disability in lumbar PIVD condition. In this study 30 subjects were selected and divided into 2 groups randomly. The Group A subject received McKenzie extension exercise and group B subject received Core strengthening exercise. Both the group were treated for 2 weeks. The patients were treated for 6 sessions on a week. The Results of this study suggested that McKenzie extension exercise protocol was more effective in comparison to core strengthening in low back pain with PIVD condition.

Numeric Pain Rate Scale was used for pain evaluation in this study. This is supported by a study conducted by Yao et al [2020] a study on comparison between the low back pain scales for patients with lumbar disc herniation: validity, reliability, and responsiveness. For this study a total of 353 lumbar disc herniation patients were enrolled. The results says that NPRS, and ODI or RMDQ is recommended in studies related to LDH patients, while if the quality of life also needed to observe, the NPRS and JOABPEQ would be more appropriate rather than SF-36.

Functional disability of the patient in this study was assessed using Oswestry disability Index Questionnaire. Sang won park et al [2014] Conducted a study on the dischargeable cut-off score of Oswestry disability index (ODI) in the inpatient care for low back pain with disability. The result says that ODI at the time of discharge was most accurate in determining dischargeable patients. The cut-off value of ODI was 30. Predictors were ODI questions 4 and 6. Analysis of current results shows that Mckenzie and core strengthening exercises are effective in reducing pain and disability in patients with CLBP. However further research is needed to determine whether they are definitely better than other treatment options.

#### **Limitations of the study:**

- The experiment was conducted on subject with moderate functional disability.
- The study was performed on a single 24year old male individual.
- The study has only included patient with chronic non-specific low back pain.
- The duration of the study is limited to 2 weeks.
- Long term effect of Mckenzie and core strengthening exercise is not known.

#### **Scope of study:**

- Further research can be conducted in a larger population with longer duration, with different outcome measures and with different exercise therapy interventions for individuals with low back pain.
- Further study can be conducted on subject with severe functional disability.
- Comparative study can be conducted by using various other complementary and alternative therapies to find out the effectiveness in reducing low back pain.
- Comparative study can also be conducted between Mckenzie and core strengthening exercise and pharmacological and surgical treatment.

### **5. CONCLUSION**

The findings of this study concluded that Mckenzie and Core strengthening exercises can be recommended in reducing pain intensity, functional disability and improving quality of life in a patient with chronic non-specific low back pain. Further studies are required to understand the long-term effect of McKenzie and core strengthening exercises in different age group patients.

#### **Declaration by Authors**

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**Conflict of Interest:** The authors declare no conflict of interest.

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