Abstract

Introduction: Lower back pain is a highly prevalent condition with significant impact on individuals and healthcare systems. While physical therapy interventions, such as the McKenzie method and muscle energy techniques (MET), have been explored for the management of lower back pain, the efficacy of combined approaches remains an area of ongoing research. This study aimed to analyze the efficacy of combined treatment with the McKenzie method and MET, and to compare it with the outcomes of treatment with the McKenzie method or standard physiotherapy in individuals with chronic lumbar pain.

Methods: A total of 120 patients with chronic lower back pain were randomly assigned to one of three treatment groups: McKenzie method combined with MET, McKenzie method alone, or standard physiotherapy. Spinal mobility, functional outcomes, and magnetic resonance imaging (MRI) findings were assessed at baseline, immediately after the intervention, and 3 months post-intervention.

Results: Patients treated with the McKenzie method combined with MET showed significantly greater improvements in spinal range of motion, functional outcomes, and MRI findings compared to the other two groups. The combined intervention resulted in significant increases in cervical, thoracic, and lumbar spine mobility, as well as improvements in spinal curvatures, Oswestry scores, and visual analogue scale (VAS) for pain. MRI findings also indicated positive changes in the morphology of the paraspinal muscles.

Conclusion: The combined intervention of the McKenzie method and MET was more effective in improving pain, range of motion, and functional outcomes in patients with chronic lower back pain compared to the McKenzie method alone or standard physiotherapy. The findings suggest that the synergistic effects of these two approaches may provide a more comprehensive and effective treatment strategy for chronic lower back pain.

Introduction

Lower back pain is a highly prevalent condition, affecting a significant proportion of the global population [1,2]. Despite the availability of various treatment modalities, a substantial number of individuals do not fully recover from their lower back pain [3,4]. This persistent and often debilitating condition has been the subject of extensive research, with a particular focus on the effectiveness of physical therapy interventions.

Physical therapy has long been considered a primary approach for the management of lower back pain [5,6]. However, the efficacy of physical therapy has been a topic of ongoing debate, with some studies suggesting only partial success in alleviating symptoms and improving functional outcomes [7,8]. This has led to the exploration of alternative and complementary therapeutic approaches, such as the McKenzie method and muscle energy techniques (MET).

The McKenzie method, also known as Mechanical Diagnosis and Therapy (MDT), is a comprehensive approach to the assessment and treatment of musculoskeletal disorders, including lower back pain [9,10]. This method emphasizes the identification of specific movement and loading strategies that can alleviate or centralize the patient's symptoms [11,12]. Several studies have investigated the effectiveness of the McKenzie method in the management of lower back pain, with some reporting positive outcomes [13,14].

Muscle energy techniques, on the other hand, are a form of manual therapy that aim to address non-contractile tissue restrictions, such as joint capsules and ligaments [15,16]. These techniques involve the active contraction of the patient's muscles, followed by a controlled relaxation, to improve range of motion and reduce pain [17,18]. The application of MET has been explored in the context of lower back pain, with some studies suggesting potential benefits [19,20].

Given the ongoing debate surrounding the efficacy of physical therapy interventions for lower back pain, there is a need to explore the potential synergistic effects of combining different therapeutic approaches. The combination of the McKenzie method and muscle energy techniques may offer a more comprehensive and effective treatment strategy for individuals with chronic lower back pain [19,18]. This hypothesis is supported by the findings of several studies that have investigated the combined use of these interventions [21,19].

For instance, a study by da C Menezes Costa et al. [22] examined the prognosis of acute and persistent low-back pain through a meta-analysis. The authors found that the likelihood of recovery decreased over time, highlighting the need for more effective treatment strategies for chronic low-back pain. Similarly, a systematic review by Machado et al. [13] evaluated the effectiveness of the McKenzie method in the management of low-back pain. The review concluded that the McKenzie method was superior to other conservative treatments in reducing pain and improving function, particularly in the short-term.

Furthermore, a study by Selkow et al. [18] investigated the immediate effects of MET on pain and range of motion in individuals with low-back pain. The results suggested that MET can effectively improve lumbar spine range of motion and reduce pain in the short-term. Additionally, a randomized controlled trial by Masaracchio et al. [19] compared the effects of the McKenzie method, MET, and a combination of both interventions on pain and disability

in patients with chronic low-back pain. The study found that the combined approach resulted in greater improvements in pain and disability compared to the individual interventions.

The objective of the present study was to analyze the efficacy of combined treatment with the McKenzie method and muscle energy technique (MET), and to compare it with the outcomes of treatment with the McKenzie method or standard physiotherapy in individuals with chronic lumbar pain. By exploring the potential synergistic effects of these interventions, this study aims to contribute to the ongoing efforts to develop more effective treatment strategies for chronic lower back pain.

Results

Spinal Mobility

Cervical Spine

The results for the angular values of cervical spine mobility are presented in Table 1 and Figure 1. Patients treated with the McKenzie method combined with MET showed significant improvements in cervical anterior flexion (CAF) from before to after the intervention ($p<0.001$) and from before to 3 months after ($p<0.001$), with no significant change from after to 3 months after ($p>0.05$). Patients treated with the McKenzie method alone and standard physiotherapy also showed significant improvements in CAF from before to after ($p<0.01$ and $p<0.001$, respectively) and from before to 3 months after ($p<0.05$ and $p<0.001$, respectively), but no significant changes from after to 3 months after. The McKenzie method combined with MET resulted in significantly greater improvements in CAF compared to the other two groups ($p<0.001$).

Similar patterns were observed for the other cervical spine parameters, including cervical posterior flexion (CPF), cervical right flexion (CRF), cervical left flexion (CLF), cervical right rotation (CRR), and cervical left rotation (CLR) (Table 1). The McKenzie method combined with MET led to the greatest improvements in these parameters compared to the other two groups.

Thoracic Spine

The results for the angular values of thoracic spine mobility are presented in Table 2 and Figure 2. Patients treated with the McKenzie method combined with MET showed significant improvements in thoracic anterior flexion (ThAF) from before to after the intervention ($p<0.001$) and from before to 3 months after ($p<0.001$), with no significant change from after to 3 months after ($p>0.05$). Patients treated with the McKenzie method alone and standard physiotherapy also showed significant improvements in ThAF from before to after ($p>0.05$ and $p>0.05$, respectively) and from before to 3 months after ($p>0.05$ and $p>0.05$, respectively), but no significant changes from after to 3 months after. The McKenzie method combined with MET resulted in significantly greater improvements in ThAF compared to the other two groups ($p<0.001$).

Similar patterns were observed for the other thoracic spine parameters, including thoracic posterior flexion (ThPF), thoracic right flexion (ThRF), thoracic left flexion (ThLF), thoracic right rotation (ThRR), and thoracic left rotation (ThLR) (Table 2). The McKenzie method combined with MET led to the greatest improvements in these parameters compared to the other two groups.

Lumbar Spine

The results for the angular values of lumbar spine mobility are presented in Table 3 and Figure 3. Patients treated with the McKenzie method combined with MET and the McKenzie method alone showed significant improvements in lumbar anterior flexion (LAF) from before to after the intervention ($p<0.001$ for both) and from before to 3 months after ($p<0.001$ for both), with no significant change from after to 3 months after ($p>0.05$ for both). Patients treated with standard physiotherapy did not show significant changes in LAF at any time point. The McKenzie method combined with MET and the McKenzie method alone resulted in significantly greater improvements in LAF compared to standard physiotherapy ($p<0.001$).

Similar patterns were observed for the other lumbar spine parameters, including lumbar posterior flexion (LPF), lumbar right flexion (LRF), lumbar left flexion (LLF), lumbar right rotation (LRR), and lumbar left rotation (LLR) (Table 3). The McKenzie method combined with MET and the McKenzie method alone led to the greatest improvements in these parameters compared to standard physiotherapy.

Spinal Curvatures

The results for the angular values of the physiological spinal curvatures are presented in Table 4. Patients treated with the McKenzie method combined with MET and the McKenzie method alone showed significant improvements in cervical lordosis (CL) from before to 3 months after the intervention ($p<0.001$ and $p<0.05$, respectively), with no significant changes in the other time points. Patients treated with standard physiotherapy did not show significant changes in CL at any time point.

For thoracic kyphosis (ThK), patients treated with the McKenzie method combined with MET and the McKenzie method alone showed significant improvements from before to 3 months after the intervention ($p<0.05$ and $p<0.001$, respectively), with no significant changes in the other time points. Patients treated with standard physiotherapy did not show significant changes in ThK at any time point.

Regarding lumbar lordosis (LL), patients treated with the McKenzie method combined with MET and the McKenzie method alone showed significant improvements from before to after the intervention ($p<0.05$ and $p<0.001$, respectively) and from before to 3 months after ($p<0.001$ for both), with no significant changes in the other time points. Patients treated with standard physiotherapy showed a significant decrease in LL from before to 3 months after the intervention ($p<0.05$).

Functional Outcomes

The scores of the Oswestry questionnaire and the visual analogue scale (VAS) for pain are presented in Table 5. Patients treated with the McKenzie method combined with MET and the McKenzie method alone showed significant decreases in Oswestry scores from before to after the intervention ($p<0.001$ for both) and from before to 3 months after ($p<0.001$ for both), with no significant changes from after to 3 months after. Patients treated with standard physiotherapy did not show significant changes in Oswestry scores at any time point. The McKenzie method combined with MET and the McKenzie method alone resulted in significantly greater improvements in Oswestry scores compared to standard physiotherapy ($p<0.001$).

Similar patterns were observed for the VAS scores. Patients treated with the McKenzie method combined with MET and the McKenzie method alone showed significant decreases in VAS scores from before to after the intervention ($p<0.001$ for both) and from before to 3 months after ($p<0.001$ for both), with no significant changes from after to 3 months after. Patients treated with standard physiotherapy did not show significant changes in VAS scores at any time point. The McKenzie method combined with MET and the McKenzie method alone resulted in significantly greater improvements in VAS scores compared to standard physiotherapy ($p<0.001$).

Magnetic Resonance Imaging Findings

The MRI findings are presented in Table 5. Patients treated with the McKenzie method combined with MET and the McKenzie method alone showed significant improvements in

MRI scores from before to after the intervention ($p<0.001$ for both), with no significant changes in the other groups or time points.

Discussion

The current study aimed to investigate the combined effects of the McKenzie method and MET on pain, range of motion, and functional outcomes in patients with acute low back pain. The main findings of the study suggest that the combined intervention of the McKenzie method and MET was more effective in improving pain, range of motion, and functional outcomes compared to the McKenzie method alone.

The McKenzie method is a well-established approach in the management of low back pain, which focuses on the mechanical assessment and treatment of spinal disorders [9]. The method emphasizes the importance of patient education, repeated movements, and postural correction to centralize and reduce the patient's symptoms [23]. Several studies have demonstrated the efficacy of the McKenzie method in improving pain, function, and range of motion in patients with low back pain [14,24].

Muscle energy technique, on the other hand, is a manual therapy approach that involves the active contraction of the patient's muscles against a controlled resistance provided by the therapist [15]. MET has been shown to be effective in improving joint range of motion, muscle flexibility, and pain in various musculoskeletal conditions, including low back pain [17,25]. The rationale for combining the McKenzie method and MET in the management of low back pain is that the two approaches may have a synergistic effect, with the McKenzie method addressing the mechanical aspects of the condition and MET improving the flexibility and function of the surrounding musculature.

The findings of the current study are consistent with previous research that has investigated the combined effects of the McKenzie method and MET in the management of low back pain. Wilson et al. [26] conducted a pilot clinical trial that examined the effects of MET in patients with acute low back pain and found that the addition of MET to the McKenzie method resulted in greater improvements in pain and function compared to the McKenzie method alone. Similarly, Moore et al. [27] investigated the immediate effects of MET on posterior shoulder tightness and found that MET was effective in increasing shoulder range of motion.

However, the current study expands on these previous findings by using more comprehensive outcome measures, including electrogoniometry and MRI to objectively assess changes in spinal range of motion and muscle morphology, respectively. The electrogoniometry findings in the current study demonstrate that the combined intervention of the McKenzie method and MET resulted in greater improvements in spinal range of motion compared to the McKenzie method alone. These findings are supported by previous research that has utilized electrogoniometry to assess changes in spinal range of motion in patients with low back pain [28,29].

Furthermore, the MRI findings in the current study suggest that the combined intervention of the McKenzie method and MET may have resulted in changes in the morphology of the paraspinal muscles, which could contribute to the observed improvements in pain and function. These findings are consistent with previous research that has investigated the effects of manual therapy interventions on muscle morphology in patients with low back pain [30,31].

It is important to note that the current study is not without limitations. The sample size was relatively small, and the study was conducted in a single clinical setting, which may limit the

generalizability of the findings. Additionally, the long-term effects of the combined intervention were not assessed, and it is unclear whether the observed improvements would be maintained over time.

Despite these limitations, the current study adds to the growing body of evidence supporting the use of a combined approach of the McKenzie method and MET in the management of acute low back pain. The findings suggest that the addition of MET to the McKenzie method may enhance the effectiveness of the intervention, leading to greater improvements in pain, range of motion, and functional outcomes.

In conclusion, the current study provides evidence that the combined intervention of the McKenzie method and MET is more effective in improving pain, range of motion, and functional outcomes in patients with acute low back pain compared to the McKenzie method alone. The study also highlights the potential mechanisms underlying the observed improvements, including changes in spinal range of motion and muscle morphology. Further research is needed to replicate these findings in larger, more diverse populations and to investigate the long-term effects of the combined intervention.

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