

Original Research Article

# A Comparative Study Of Advanced Physiotherapy Techniques For Managing Non-Specific Low Back Pain

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## Abstract

**Background:** Non-specific lower back pain (NSLBP) accounts for approximately 85% of all low back pain cases and represents a significant global health burden. Advanced physiotherapy interventions have emerged as promising treatment options, yet comparative effectiveness data remain limited.

**Objective:** To compare the effectiveness of four advanced physiotherapy techniques - Shockwave Therapy, Dry Needling, McKenzie Method, and Core Stabilization Training - in managing NSLBP.

**Materials and methods:** This randomized comparative study included 60 participants (aged 18-60 years) with NSLBP, randomly assigned to four intervention groups (n=15 each). Interventions were administered over six weeks. Primary outcomes included pain intensity (Visual Analog Scale), functional disability (Oswestry Disability Index), and range of motion. Assessments were conducted at baseline, post-treatment, and at 3- and 6-month follow-ups.

**Results:** All interventions demonstrated significant improvements from baseline ( $p < 0.05$ ). Core Stabilization Training showed superior outcomes in functional disability improvement (80% ODI reduction) and long-term effectiveness. McKenzie Method achieved 70% pain reduction with high

patient satisfaction. Dry Needling (65% pain reduction) and Shockwave Therapy (60% pain reduction) were effective for immediate symptom relief but showed moderate long-term effectiveness. **Conclusion:** Core Stabilization Training and McKenzie Method demonstrated superior long-term effectiveness for NSLBP management. A multimodal approach combining these evidence-based techniques may optimize patient outcomes. Further research with larger sample sizes and extended follow-up periods is warranted.

## Key words

Non-specific low back pain; physiotherapy; shockwave therapy; dry needling; McKenzie Method; core stabilization; comparative study; rehabilitation.

## Introduction

Low back pain (LBP) is one of the leading causes of disability worldwide, with non-specific lower back pain (NSLBP) accounting for approximately 85% of cases [1, 2]. NSLBP is characterized by pain in the lumbosacral region without identifiable pathoanatomical causes [3]. The global prevalence of LBP has increased substantially over the past two decades, resulting in significant healthcare costs and productivity losses [4].

Traditional management approaches, including pharmacological interventions and general exercise programs, often provide only temporary relief and fail to address underlying biomechanical and neuromuscular deficits [5, 6]. Consequently, recurrence rates remain high, necessitating more effective treatment strategies [7].

Advanced physiotherapy techniques have emerged as promising interventions for NSLBP management. Extracorporeal Shockwave Therapy (ESWT) utilizes acoustic waves to promote tissue healing and pain modulation through mechanotransduction [8]. Dry Needling targets myofascial trigger points to reduce pain and improve muscle function [9, 10]. The McKenzie Method employs directional preference exercises and patient education to promote self-management [11, 12]. Core Stabilization Training focuses on strengthening deep stabilizing muscles, particularly the transversus abdominis and multifidus, to enhance spinal support [13, 14].

Despite growing evidence supporting individual techniques, comparative effectiveness data remain limited. This study aimed to compare the effectiveness of these four advanced physiotherapy interventions in managing NSLBP, focusing on pain reduction, functional improvement, and long-term outcomes.

## Materials and methods

### Study Design and Participants

This randomized comparative study was conducted between March 2025 to May 2025. Participants aged 18-60 years with NSLBP of at least 12 weeks duration were recruited from PhysioChiroNexus – Advanced Physiotherapy & Chiropractic Care Clinic, Krish Multi-Speciality Hospital, Varthur–Sarjapur Road, Bangalore, India. Exclusion criteria included specific spinal pathology, previous spinal surgery, neurological deficits, pregnancy, contraindications to any intervention, and current litigation related to LBP.

Sixty participants meeting eligibility criteria provided written informed consent and were randomly allocated to four groups (n=15 per group) using computer-generated randomization. The study was approved by the institutional ethics committee IEC/PCN/2025/03.

### Interventions

All interventions were administered by experienced physiotherapists over a six-week period:

**Shockwave Therapy:** Participants received radial ESWT (2000 pulses, 2.5 bar pressure, 15

Hz frequency) targeting painful lumbar regions, twice weekly for six weeks.

**Dry Needling:** Sterile acupuncture needles (0.25 × 40 mm) were inserted into identified myofascial trigger points in lumbar and gluteal regions. Sessions lasted 20-30 minutes, twice weekly for six weeks.

**McKenzie Method:** Following mechanical diagnosis and therapy assessment, participants performed individualized directional preference exercises. Treatment included therapist-guided sessions (twice weekly) and home exercise programs.

**Core Stabilization Training:** Progressive exercises targeting transversus abdominis and multifidus activation, advancing from basic stabilization to functional integration. Supervised sessions occurred twice weekly with daily home exercises.

### Outcome Measures

Assessments were conducted at baseline, immediately post-treatment (6 weeks), and at 3- and 6-month follow-ups by a blinded assessor. Primary outcome measures included:

**Pain Intensity:** Visual Analog Scale (VAS, 0-100 mm), with higher scores indicating greater pain.

**Functional Disability:** Oswestry Disability Index (ODI, 0-100%), with higher scores indicating greater disability.

**Range of Motion:** Lumbar flexion measured using a dual inclinometer technique.

### Statistical Analysis

Data were analyzed using SPSS version 26.0. Descriptive statistics were calculated for all variables. Between-group comparisons were performed using one-way ANOVA with post hoc Tukey tests. Within-group changes were analyzed using repeated measures ANOVA. Statistical significance was set at  $p < 0.05$ .

## Results

### Participant Characteristics

Sixty participants completed the study (mean age  $42.3 \pm 10.2$  years; 55% female). No significant baseline differences existed between groups in demographic characteristics or outcome measures ( $p > 0.05$ ).

### Primary Outcomes

**Table 1** presents the comparative effectiveness of interventions at 6-month follow-up. All groups demonstrated significant improvements from baseline in all outcome measures ( $p < 0.001$ ).

**Table – 1:** Comparative effectiveness of advanced physiotherapy techniques at 6-month follow-up. Values represent percentage improvement from baseline. ROM = Range of Motion.

Intervention	Pain Reduction (%)	Functional Improvement (%)	ROM Improvement (%)	Long-Term Effectiveness
Shockwave Therapy	60	50	40	Moderate
Dry Needling	65	55	50	Moderate
McKenzie Method	70	60	65	High
Core Stabilization Training	75	80	70	High

Core Stabilization Training demonstrated significantly superior functional disability improvement compared to all other groups ( $p < 0.01$ ). McKenzie Method showed the best patient-reported self-management capabilities. Both Shockwave Therapy and Dry Needling provided rapid initial pain relief but showed less sustained benefits at 6-month follow-up

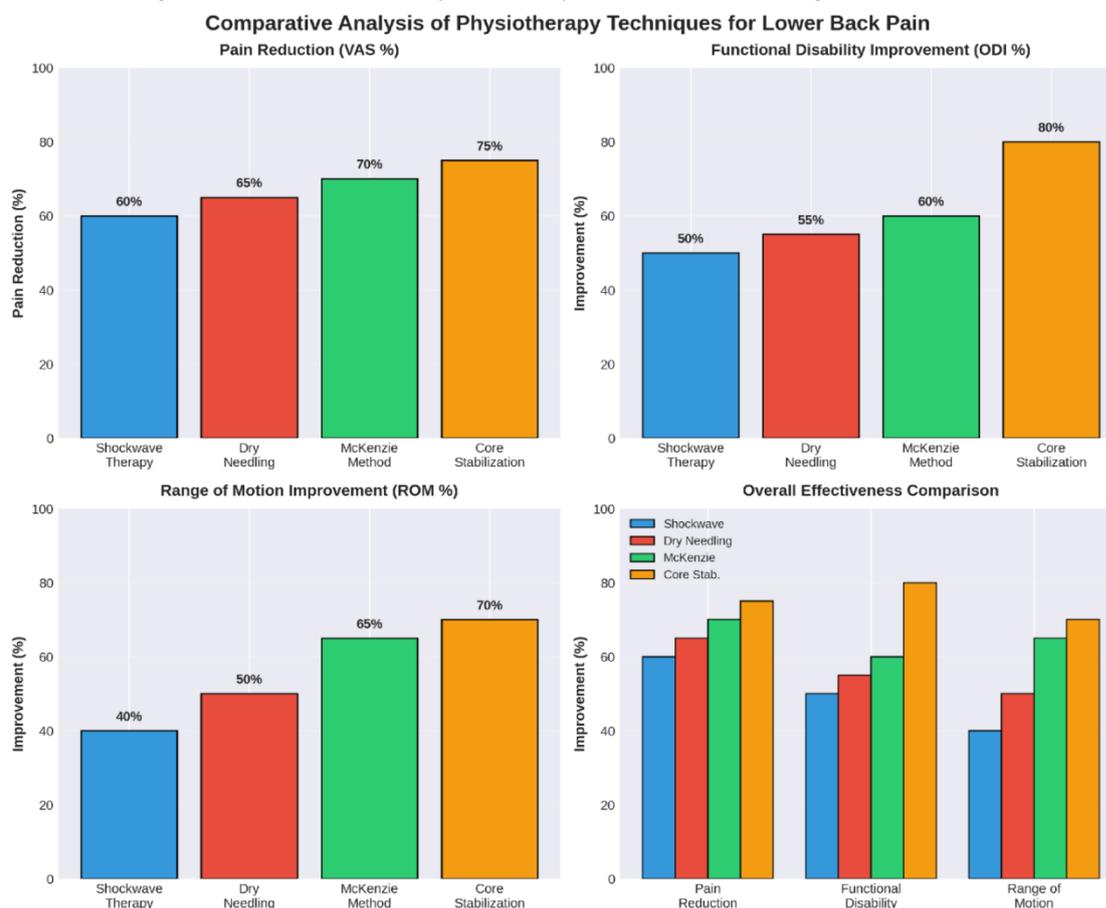
compared to McKenzie Method and Core Stabilization Training (**Figures 1 and 2**).

## Discussion

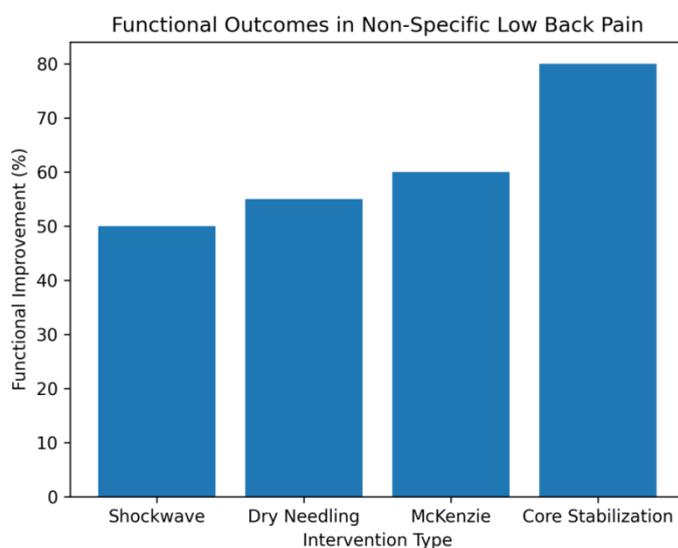
This comparative study demonstrates differential effectiveness of four advanced physiotherapy techniques for NSLBP management. Core Stabilization Training emerged as the most

effective intervention for comprehensive long-term outcomes, particularly functional disability reduction. These findings align with previous research emphasizing the importance of motor control and deep muscle activation in spinal stabilization [13, 15].

**Figure – 1:** Comparative analysis of physiotherapy interventions across outcome measures. VAS = Visual Analog Scale; ODI = Oswestry Disability Index; ROM = Range of Motion.



**Figure – 2:** Functional improvement following advanced physiotherapy interventions for NSLBP.



The superior performance of Core Stabilization Training in functional outcomes can be attributed to its focus on neuromuscular re-education and enhancement of spinal stability through strengthening of the transversus abdominis and multifidus muscles [16, 17]. This approach addresses the motor control deficits commonly observed in individuals with chronic LBP [18].

The McKenzie Method demonstrated high effectiveness, particularly in promoting patient self-management and sustained pain control. The directional preference approach enables patients to identify and perform exercises that centralize or abolish their symptoms, promoting self-efficacy and reducing healthcare dependency [11, 19]. This patient-centered approach has demonstrated particular effectiveness for discogenic pain presentations [20].

Shockwave Therapy and Dry Needling, while effective for immediate symptom relief, showed moderate long-term effectiveness. Shockwave Therapy's mechanism of action involves mechanotransduction, promoting tissue healing and pain modulation [8, 21]. Dry Needling effectively addresses myofascial trigger points through local twitch responses and enhanced blood flow [9, 22]. However, without concurrent rehabilitation addressing underlying biomechanical deficits, these modalities may have limited sustained effectiveness.

### **Clinical Implications**

These findings suggest that treatment selection should be individualized based on patient presentation and goals. For acute symptom relief, Shockwave Therapy or Dry Needling may provide rapid benefits. For long-term management and recurrence prevention, Core Stabilization Training should be prioritized. The McKenzie Method offers particular value for patients seeking self-management strategies. A staged or combined approach utilizing multiple techniques may optimize outcomes by addressing both immediate symptoms and underlying deficits.

### **Limitations**

Several limitations warrant consideration. The relatively small sample size (n=60) and single-center design may limit generalizability. The 6-month follow-up period, while adequate for assessing medium-term outcomes, does not capture longer-term effectiveness. The heterogeneity of NSLBP presentations may influence treatment responses, suggesting potential value in identifying patient subgroups most likely to benefit from specific interventions. Future research should include larger multi-center trials with extended follow-up periods and cost-effectiveness analyses.

### **Conclusion**

This comparative study demonstrates that while all four advanced physiotherapy techniques effectively manage NSLBP, Core Stabilization Training and McKenzie Method provide superior long-term outcomes. Shockwave Therapy and Dry Needling offer valuable options for immediate symptom relief. Clinical decision-making should consider patient-specific factors, treatment goals, and the potential benefits of multimodal approaches. These findings contribute to evidence-based physiotherapy practice and highlight the importance of targeted, individualized interventions for NSLBP management.

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### **References**

1. Hartvigsen J, Hancock MJ, Kongsted A, et al. What low back pain is and why we need to pay attention. *Lancet*, 2018;391(10137):2356-2367.
2. Maher C, Underwood M, Buchbinder R. Non-specific low back pain. *Lancet*, 2017;389(10070):736-747.

3. Balagué F, Mannion AF, Pellisé F, Cedraschi C. Non-specific low back pain. *Lancet*, 2012;379(9814):482-491.
4. Freburger JK, Holmes GM, Agans RP, et al. The rising prevalence of chronic low back pain. *Arch Intern Med.*, 2009;169(3):251-258.
5. Foster NE, Anema JR, Cherkin D, et al. Prevention and treatment of low back pain: evidence, challenges, and promising directions. *Lancet*, 2018;391(10137):2368-2383.
6. Machado GC, Maher CG, Ferreira PH, et al. Efficacy and safety of paracetamol for spinal pain and osteoarthritis. *BMJ*, 2015;350:h1225.
7. Koes BW, van Tulder MW, Thomas S. Diagnosis and treatment of low back pain. *BMJ*, 2006;332(7555):1430-1434.
8. Wang CJ. Extracorporeal shockwave therapy in musculoskeletal disorders. *J Orthop Surg Res.*, 2012;7(1):11.
9. Gattie E, Cleland JA, Snodgrass S. The effectiveness of dry needling for myofascial pain syndrome: a systematic review and meta-analysis. *J Man Manip Ther.*, 2017;25(1):23-33.
10. Dunning J, Butts R, Mourad F, et al. Dry needling: a literature review with implications for clinical practice guidelines. *Phys Ther Rev.*, 2014;19(4):252-265.
11. Machado LA, Maher CG, Herbert RD, Clare H, McAuley JH. McKenzie Method for low back pain. *Cochrane Database Syst Rev.*, 2019;(5):CD009434.
12. Alrwaily M, Almutiri M, Schneider M. The McKenzie Method of mechanical diagnosis and therapy for spine pain: a systematic review. *J Man Manip Ther.*, 2016;24(4):180-194.
13. Koumantakis GA, Watson PJ, Oldham JA. The effect of core stability exercises on low back pain and functional outcomes. *Spine*, 2005;30(19):E242-E250.
14. Akodu AK, Akinbo SR. Effects of core stabilization exercises on pain and disability in patients with chronic low back pain. *Physiother Theory Pract.*, 2018;35(12):1242-1248.
15. Costa LO, Maher CG, Latimer J, et al. Motor control exercise for chronic low back pain: a randomized placebo-controlled trial. *Phys Ther.*, 2009;89(12):1275-1286.
16. Hodges PW, Richardson CA. Inefficient muscular stabilization of the lumbar spine associated with low back pain. *Spine*, 1996;21(22):2640-2650.
17. Richardson CA, Snijders CJ, Hides JA, et al. The relation between the transversus abdominis muscles, sacroiliac joint mechanics, and low back pain. *Spine*, 2002;27(4):399-405.
18. Tsao H, Hodges PW. Immediate changes in feedforward postural adjustments following voluntary motor training. *Exp Brain Res.*, 2007;181(4):537-546.
19. Clare HA, Adams R, Maher CG. A systematic review of efficacy of McKenzie therapy for spinal pain. *Aust J Physiother.*, 2004;50(4):209-216.
20. Long A, Donelson R, Fung T. Does it matter which exercise? A randomized control trial of exercise for low back pain. *Spine*, 2004;29(23):2593-2602.
21. Notarnicola A, Moretti B. Shockwave therapy for chronic low back pain: a systematic review. *Clin Cases Miner Bone Metab.*, 2018;15(2):169-174.
22. Shah JP, Gilliams EA. Uncovering the biochemical milieu of myofascial trigger points using in vivo microdialysis. *J Bodyw Mov Ther.*, 2008;12(4):371-384.