

# Effect of Pulsed Electromagnetic Field Therapy Combined with Conventional Physiotherapy on Pain and Disability in Individuals with Lumbar Disc Herniation - A Case Report

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## ABSTRACT

**Introduction:** This case report aims to explore the effects of combining pulsed electromagnetic field (PEMF) therapy with conventional physiotherapy in managing lumbar disc herniation (LDH). A 41-year-old male patient presented with complaints of low back pain radiating to the right lower limb, accompanied by numbness and intermittent tingling sensations. The symptoms had persisted for 3 months progressively affecting the patient's mobility and daily activities.

**Methods:** A treatment protocol integrating PEMF therapy with conventional physiotherapy, including manual therapy and exercises, was administered for 3 weeks. Pain intensity and disability levels were assessed using standardized outcome measures, the Numeric Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI).

**Result:** Following treatment, the patient experienced a marked reduction in pain and improvement in functional capacity. The NPRS decreased from 7/10 to 2/10 in 15 sessions, and the ODI score improved from 80 % to 32%.

**Discussion:** This case highlights the potential benefits of integrating PEMF therapy with conventional physiotherapy in the management of LDH. Although findings from a single case cannot be generalized, this report supports the need for further investigation into the combined use of PEMF and conventional physiotherapy as a conservative treatment strategy for LDH.

**Conclusion:** This report suggests that integrating PEMF therapy with standard physiotherapy may be beneficial for managing LDH. Further research is required to validate these findings in larger populations.

**Keywords:** Lumbar Disc herniation, pulsed electromagnetic field therapy, pain management, functional recovery, non-invasive treatment, rehabilitation

## INTRODUCTION

Lumbar disc herniation (LDH) is a prevalent spinal condition characterized by the displacement of the nucleus pulposus beyond

the intervertebral disc space, leading to nerve compression and associated symptoms such as lower back pain and radiculopathy [1]. This condition significantly impacts patient's

quality of life and daily activities. Lumbar disc herniation has a prevalence of 1%-3% of population annually [2]. Annually, approximately 5 to 20 individuals per 1,000 adults are affected by disc herniation. It is more common in third to fifth decade of life [1].

The pathophysiology of LDH involves the rupture of the annulus fibrosus, allowing the nucleus pulposus to protrude and potentially impinge on adjacent neural structures [3]. Based on imaging and pathological morphology, Lumbar disc herniation can be categorized into different types-according to the part that protrudes – central, paramedian and foraminal. On the basis of degree of protrusion disc herniation is classified as-Bulge, protrusion and extrusion. On the basis of surgical pathomorphism - ruptured, non-ruptured and sequestered type [4]. Common risk factors include age-related degenerative changes, repetitive spinal stress, lifestyle, occupational and genetic predisposition. Other risk factors for LDH are smoking, axial loading, height and obesity [5].

The signs and symptoms of LDH include persistent or intermittent pain in the lumbar region. This pain may worsen with movements such as bending, lifting, prolonged sitting or standing. Patient may experience sharp, burning, or shooting pain that radiates from the lower back through the buttock and into the leg, following the path of the affected nerve root- commonly due to compression or irritation of the nerve. Additional symptoms may include numbness or tingling sensation and muscle weakness in the areas innervated by the affected nerve root [6].

The Straight Leg Raise (SLR) test is a key clinical manoeuvre for detecting lumbar radiculopathy, with a positive test indicating nerve root irritation [7]. Imaging studies are crucial for confirming the diagnosis. Magnetic Resonance Imaging (MRI) is the gold standard, providing detailed visualization of disc pathology, nerve root compression, and associated inflammatory changes [6]. Computed Tomography (CT)

can be useful in cases where MRI is contraindicated [1].

Management strategies for LDH range from conservative treatments, such as physical therapy and pharmacological interventions, to surgical options like discectomy. The choice of treatment depends on the severity of symptoms, neurological findings, and patient preferences [8].

This case report examines the impact of combining pulsed electromagnetic field therapy with conventional physiotherapy on pain and disability levels in an individual with lumbar disc herniation, highlighting the potential benefits of integrative non-invasive treatment approaches.

## **CASE REPORT**

A 41 years-old male, with no history of trauma or known comorbidities, presented with a 3 months history of lower back pain radiating to his right leg. The pain was described as a sharp, burning sensation extending from the lower back through the gluteal region, down the posterior thigh, and into the lateral foot. Patient also reported intermittent numbness and tingling sensation along the same distribution. The pain worsened with prolonged sitting, forward bending, and weight lifting, while mild relief was achieved with rest. Patient denied any history of bladder or bowel dysfunction, systemic symptoms, or prior spinal conditions. The pain was gradual in onset and progressively worsened, limiting daily activities such as walking, sitting for extended periods, and bending. No significant family history of spinal disorders was noted. Previous treatment included prescribed pain medications and physical therapy involving low back exercises from various centres, which provided no significant relief.

The patient reported a pain score of 7/10 on the Numeric Pain Rating Scale (NPRS). The pain was severe and did not very much. The pain affected the patient's sleep and all activities of daily living. It significantly limited their ability to walk more than 500 meters or sit for more than 10 minutes. The

patient was also unable to stand for longer than 1 minute due to the severity of the pain. On physical examination, the patient had mild tenderness over the lower paraspinal muscles, with no spinal deformity. Severe pain was noted in the lumbar region, radiating down the right leg, and was aggravated by movements including flexion, extension, lateral bending and rotation. There was a decrease in all range of motion of lumbar spine, limited by pain and muscle spasm. The Straight Leg Raise (SLR) test was positive at 40 degrees, indicating nerve root irritation. The test was performed with the patient in supine position. The leg was raised with the knee extended, gradually increasing hip flexion. The test was stopped when the patient reported pain or discomfort, and the angle at which symptoms appeared was recorded. To further confirm nerve root irritation, dorsiflexion of the ankle was applied to assess for symptom reproduction. Sensory deficits were noted in the affected dermatome (L5-S1).

### **DIAGNOSTIC ASSESSMENT**

MRI finding confirmed lumbar disc herniation at the L5-S1 level, with evidence of nerve root compression. No signs of spinal instability or red flag symptoms were observed.

### **GOALS OF TREATMENT**

The short-term goals of the intervention were to reduce pain intensity, as measured by the standard pain assessment tool NPRS, and to decrease muscle tightness and local inflammation in order to enhance the patient's tolerance to daily functional activities. The long-term goals focused on achieving minimal to no pain during daily tasks, restoring full functional mobility and independence, improving core strength and spinal stability, and preventing recurrence through patient education and postural correction.

### **TREATMENT**

The patient underwent a combined treatment approach involving Pulsed Electromagnetic

Field (PEMF) therapy and Conventional physiotherapy, specifically designed to reduce pain and improve functional mobility in lumbar disc herniation. PEMF therapy was administered using a Physio Magneto Neo (PMST-3 NEO). The treatment was targeted over the lumbar spine region, specifically between L5-S1 segments, where clinical and radiological findings indicated disc herniation. The patient was positioned comfortably in the prone position ensuring optimal exposure of the lumbar area while maintaining spinal alignment. The PEMF device used delivered electromagnetic pulses with preset frequencies in Super Transduction (ST) mode (1k Hz, 3k Hz, 2k Hz) for 10 minutes followed by Magneto Transduction (MT) mode (7 Hz, 25 Hz, 10 Hz) for another 10 minutes. The intensity was gradually increased at the beginning of each session and adjusted according to the patient's tolerance level. This approach ensured patient comfort while maintaining adequate therapeutic dosage. Each session lasted 20 minutes and was conducted five times per week over a three-week period, totalling 15 treatment sessions. The patient was instructed to remove any metal accessories and electronic devices, including mobile phones, prior to the procedure. The applicator, consisting of a flexible pad was placed directly over the lower back region and secured to ensure consistent contact throughout the session. The treatment was painless and non-invasive, no special preparation was required prior to application, and the patient remained relaxed during the procedure. No adverse reaction or discomfort were reported during the entire treatment course. The use of PEMF therapy aimed to reduce inflammation, alleviate pain, enhance circulation, and support the healing of affected soft tissues by influencing cellular activity and membrane ion exchange. In parallel, the patient received conventional physiotherapy interventions including pain-relieving modalities such as transcutaneous electrical nerve stimulation (TENS) and moist heat therapy, which were used to manage acute pain and muscle spasm.

To address associated muscle tightness and soft tissue restrictions commonly seen with lumbar disc herniation, Myofascial Release (MFR) techniques were incorporated. These manual therapy techniques targeted hypertonic and shortened muscles, particularly the lumbar paraspinals, quadratus lumborum, gluteal muscles, and hamstrings. MFR was performed through gentle, sustained pressure applied along the

fascial planes to release adhesions, improve tissue mobility, and enhance circulation. Sessions included both direct and indirect MFR methods, tailored to the patient's level of tolerance and muscular response. Special attention was given to releasing tension in the thoracolumbar fascia and the iliopsoas region, as restrictions in these areas often contribute to altered lumbar biomechanics and persistent pain.



**Fig. 1. Application of Pulsed Electromagnetic Field (PEMF) therapy to the lumbar spine region in a patient with lumbar disc herniation.**

To complement PEMF therapy and MFR, the patient participated in a targeted exercise program focusing on lumbar mobility, core stabilization, and neuromuscular control. The prescribed exercises included single knee-to-chest and bilateral knee-to-chest stretches, Lion's pose, core stabilization exercises and dynamic neuromuscular stabilization (DNS) exercises. These exercises were selected to improve spinal mobility, core stability, and neuromuscular control, which are commonly targeted in the rehabilitation of individuals with lumbar disc herniation.

### **RE-ASSESSMENT AND RESULTS**

The patient's progress was evaluated using the Numeric Pain Rating scale and Oswestry

Disability Index to assess changes in pain intensity and functional limitations after the three-week treatment program. The NPRS was used to measure the patient's pain intensity on a scale of 0 to 10, where 0 represents no pain and 10 represents the worst pain imaginable. At baseline, the NPRS score was 7/10, indicating severe pain. Following the intervention, the NPRS Score reduced to 2/10, representing a 71.4% reduction in pain intensity. At baseline, the patient recorded an ODI score of 80%, which falls within the 'crippling disability' category, indicating that pain significantly interfered with daily activities such as walking, sitting, standing, and personal care. Following the intervention, the patient's ODI score improved markedly to 32%. this score

reflects a shift to the 'moderate disability' category, demonstrating a substantial improvement in the patient's functional ability and quality of life. The 60% reduction in the ODI score indicated a marked improvement in functional capacity, enabling a return to routine work and household activities. Intermittent pain and functional limitations persisted during prolonged standing, walking, and lifting, though basic personal care and light activities became manageable. Muscle tightness and fascial restrictions decreased, contributing to better postural alignment and movement efficiency. The patient regained independence in daily tasks and was educated on ergonomics and home exercises to support long-term spinal health. By the end of the three-week program, light lifting was manageable, sleep quality had improved, and the patient resumed part-time work and social activities, reporting enhanced physical and mental well-being. No adverse effects or setbacks were noted during the treatment course.

## **DISCUSSION**

Lumbar disc herniation (LDH) is a common condition often characterized by localized and/or radiating low back pain, functional impairment, and associated muscle guarding due to nerve root compression and inflammatory changes [9]. The current case report demonstrates the effectiveness of a combined approach involving Pulsed Electromagnetic Field therapy and conventional physiotherapy in significantly reducing pain and disability in an individual with lumbar disc herniation. The notable decrease in the NPRS Score from 7/10 to 2/10 and the improvement in the ODI Score from 80% to 32% reflect substantial clinical progress in both pain intensity and functional capacity. These results align with previous studies suggesting that PEMF therapy may influence cellular physiology through increased microcirculation, modulation of inflammatory pathways, and enhancement of tissue repair processes [10]. PEMF therapy have shown to reduce pain and improve

functionality [11], suggesting that it may enhance the effects of physiotherapy in managing pain and disability in lumbar disc herniation.

Additionally, conventional physiotherapy played a critical role in reducing muscle tightness and fascial restrictions associated with lumbar disc pathology. Chronic low back pain is often accompanied by myofascial dysfunction, particularly in muscles like the quadratus lumborum, piriformis, iliopsoas, and paraspinals.

The incorporation of specific exercises was aimed at enhancing spinal flexibility, deep core activation, and postural re-education. DNS, in particular, emphasizes motor control through developmental movement patterns, which can improve spinal stability and movement efficiency. These exercises likely reinforced the structural benefits of PEMF by promoting active muscle engagement and correcting faulty movement patterns. From a clinical standpoint, the use of a multimodal approach as demonstrated in this case offers several advantages. While PEMF therapy provides a non-invasive, passive modality that may promote tissue healing and reduce inflammation [10], MFR addresses soft tissue dysfunctions [12], and exercise therapy promotes long-term neuromuscular adaptation and self-management [13]. The integration of these components creates a comprehensive and individualized rehabilitation plan tailored to the complex nature of disc herniation [14].

## **CONCLUSION**

The combination of PEMF therapy with conventional physiotherapy demonstrated a significant reduction in pain and disability in an individual with LDH. The synergistic effect of these interventions appears to enhance functional recovery and improve quality of life without adverse effects. However, as this is a single case report, the findings cannot be generalized. Future research involving larger sample sizes and randomized controlled trials is needed to validate the synergistic effects of PEMF

therapy and conventional physiotherapy in treating disc-related pathologies.

### Declaration by Authors

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