

Multimodal Physiotherapy for Lumbar Herniated Nucleus Pulposus: A Case Report

Rezky Izzati Afiah¹, Yusfina², Djohan Aras³

^{1,2}Physiotherapy Professional Study Program, Faculty of Nursing, Hasanuddin University, Makassar, Indonesia

³Physio Sakti Clinic, Makassar, Indonesia

Corresponding author:

Name: Rezky Izzati Afiah

E-mail: afiahrezky1@gmail.com

Phone: +62 821-9776-5930

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Abstract

Background: Lumbar herniated nucleus pulposus (HNP) can cause low back pain, restricted range of motion, muscle weakness, and functional limitations. Multimodal physiotherapy combines several interventions to address these clinical problems.

Objective: To describe multimodal physiotherapy and observed changes in pain, range of motion, muscle strength, and functional ability in a patient with lumbar HNP.

Methods: This single-subject case report followed the CARE guidelines. A 55-year-old woman with a referral diagnosis of chronic lumbar HNP underwent four physiotherapy sessions over two weeks. Interventions included infrared, transcutaneous electrical nerve stimulation (TENS), manual therapy, stretching, McKenzie exercise, William Flexion Exercise, Bugnet exercise, bridging, strengthening, and activities of daily living training. Outcomes were assessed using the Visual Analog Scale (VAS), Oswestry Disability Index (ODI), range of motion (ROM), and Manual Muscle Testing (MMT). Findings were analyzed descriptively by comparing pre-intervention and post-intervention measurements.

Results: After four sessions, resting pain decreased from 3 to 0, tenderness from 8 to 5, and movement-related pain from 6 to 4. ODI decreased from 30% to 20%, representing an observed change of 10 percentage points. Lumbar flexion increased from 50° to 60°. Hip flexion increased from 50° to 55° on the left and from 51° to 57° on the right. Quadriceps MMT increased from 4 to 5, while other assessed muscle groups remained at 5.

Conclusion: Positive changes in pain, ROM, quadriceps strength, and functional disability were observed after four sessions of multimodal physiotherapy. These findings are descriptive and do not establish a causal treatment effect.

Keywords

Lumbar Herniated Nucleus Pulposus; Multimodal Physiotherapy; Transcutaneous Electrical Nerve Stimulation; Exercise Therapy; Pain; Functional Disability.

Introduction

Lumbar herniated nucleus pulposus (HNP) is a common spinal condition associated with low back pain, restricted movement, functional limitations, and reduced quality of life.¹ It occurs when the nucleus pulposus protrudes or extrudes through a defect in the annulus fibrosus and may result in irritation or compression of spinal nerve roots. Clinical manifestations vary and may include low back pain, radicular pain, muscle spasm, sensory disturbances, and reduced capacity to perform daily activities. Most cases occur in the lumbar region, particularly at the L4–L5 and L5–S1 levels, which are exposed to substantial biomechanical loading.¹

Lumbar disc herniation represents an important cause of disability among adults. The World Federation of Neurosurgical Societies (WFNS) Spine Committee reported that the lifetime risk of symptomatic lumbar disc herniation is approximately 1–3%, with spontaneous resolution reported in 60–90% of cases. Lumbar disc herniation is more frequently reported in men and is commonly observed among individuals aged 30–50 years.¹ Several factors may contribute to disc degeneration and herniation, including aging, trauma, repetitive lifting, prolonged sitting, obesity, and occupations involving excessive mechanical loading.¹ Age-related changes in the intervertebral disc include reduced proteoglycan content, dehydration, and structural deterioration, which may increase mechanical stress on the annulus fibrosus and contribute to disc displacement.¹ Morphologically, disc herniation can be classified as protrusion or extrusion, while sequestration refers to extruded disc material that has become separated from the originating disc.¹

Conservative management is generally considered for patients with lumbar disc herniation who do not have indications for surgery.^{1,2} Physiotherapy plays an important role in conservative management by addressing pain, mobility, muscle performance, functional limitations, and movement-related impairments.^{2,3} Various physiotherapy interventions have been used in patients with lumbar HNP, including infrared therapy, transcutaneous electrical nerve stimulation (TENS), manual therapy, McKenzie exercise, William Flexion Exercise, stretching, Bugnet exercise, bridging exercise, strengthening exercise, and activities of daily living (ADL) training.^{3–5} Previous reports have described improvements in pain, range of motion, muscle strength, and functional ability following physiotherapy interventions in patients with lumbar HNP.³

Despite the availability of these interventions, evidence regarding multimodal physiotherapy remains difficult to interpret because several interventions are frequently delivered simultaneously. Most available studies have focused on individual modalities or comparisons between specific interventions, whereas clinical practice commonly involves combining several interventions according to the patient's impairments and functional needs. Exercise therapy has also been reported to improve pain and disability in patients with lumbar disc herniation, although substantial heterogeneity remains regarding the type, intensity, frequency, and duration of exercise programs.^{3,6} This variability highlights the importance of describing the clinical reasoning, intervention components, and observed outcomes of multimodal physiotherapy in individual patients.⁷

The present case involved a 55-year-old woman with a referral diagnosis of chronic lumbar HNP and symptoms persisting for approximately one year. The patient reported low back pain radiating to both lower extremities, with worsening symptoms during the preceding three months and limitations in walking, changing position, sit-to-stand transitions, and performing prayer activities. The patient also had a history of a fall in a sitting position and previous physiotherapy without optimal improvement. The available clinical records did not contain imaging findings or a formal neurological examination; therefore, the specific level of disc involvement could not be confirmed. This limitation is important when interpreting the clinical findings and prevents the case from being presented as a radiologically or neurologically confirmed level-specific lumbar disc herniation.

From a physiotherapy perspective, the patient's clinical problems included pain, restricted lumbar and hip range of motion, muscle spasm, quadriceps weakness, and limitations in activity and participation. These findings provided the basis for an individualized multimodal intervention combining electrotherapy, thermal therapy, manual therapy, therapeutic exercise, and functional training. Because all interventions were delivered as an integrated treatment package, the present case cannot determine the independent contribution of any individual modality. In addition, changes observed after treatment may have been influenced by factors such as the natural course of the condition, home exercise, contextual effects, or spontaneous recovery.²

Therefore, this case report aimed to describe the application of a multimodal physiotherapy program and the observed changes in pain intensity, range of motion, muscle strength, and functional disability in a patient with chronic lumbar HNP following four physiotherapy sessions over two weeks. The report is intended to provide a clinically detailed description of multimodal physiotherapy in a patient with complex functional limitations while maintaining a descriptive interpretation appropriate for a single-subject case report.

Methods

This study was designed as a single-subject case report and prepared in accordance with the CARE (Case REport) guidelines.⁷ The case was identified during routine physiotherapy clinical practice at Physio Sakti Clinic, Makassar, Indonesia, between March 30 and April 11, 2026. The patient was a 55-year-old woman who worked as a homemaker and presented with low back pain radiating to both lower extremities. The symptoms had persisted for approximately one year and had become more persistent and functionally limiting during the preceding three months. Reported activity limitations included walking, changing position, transitioning from sitting to standing, moving while lying supine or side-lying, and performing prayer activities. The patient reported a previous fall in a sitting position and previous physiotherapy treatment without optimal improvement. Comorbid conditions documented in the available clinical information included hypertension, hypercholesterolemia, and hyperuricemia.

The clinical course and major stages of assessment and intervention are summarized in Table 1 to provide a chronological overview of the case. The timeline includes the patient's initial condition, baseline assessment, four physiotherapy sessions over two weeks, and the post-intervention evaluation. No follow-up assessment beyond the fourth session was available.

Table 1. Clinical timeline of the patient

Stage	Time period	Description
Initial patient condition	Approximately 1 year before treatment	The patient experienced low back pain radiating to both lower extremities. Symptoms became increasingly persistent and progressively interfered with walking, mobility, positional changes, and prayer activities. A history of falling in a sitting position and previous physiotherapy without optimal improvement was reported.
Initial assessment	Session 1	Baseline assessment included pain intensity using VAS, muscle strength using MMT, lumbar and hip ROM, SLR, Bragard test, Neri test, and functional disability using ODI.
Intervention	Weeks 1–2	Four physiotherapy sessions were provided over two weeks. The program consisted of infrared, TENS, manual therapy, stretching, Bugnet exercise, McKenzie exercise, William Flexion Exercise, bridging exercise, strengthening exercise, ADL training, and a home program.
Post-intervention evaluation	Session 4	Reassessment was performed after completion of the four-session intervention, including VAS, ROM, MMT, and ODI. No subsequent follow-up assessment was available.

The physiotherapy assessment consisted of vital signs, history taking, static and dynamic inspection, palpation, range of motion (ROM) assessment, muscle strength testing, pain assessment, neural provocation testing, and functional disability assessment.¹ Lumbar and hip active range of motion (AROM) was measured using a universal goniometer with the fulcrum positioned according to anatomical landmarks. The same examiner performed the measurements to maintain procedural consistency. The measurement approach used the neutral-zero method and recorded active ROM in the assessed movement directions. The original clinical documentation did not provide sufficient information to establish whether all individual goniometric positioning procedures were standardized according to a single published protocol.

Muscle strength was assessed using Manual Muscle Testing (MMT) on a 0–5 scale.⁸ The patient was positioned according to the muscle group being examined, with manual resistance applied while the proximal segment was stabilized to minimize substitution. Pain intensity was assessed using the Visual Analog Scale (VAS), including resting pain, tenderness, and movement-related pain. The VAS ranges from 0, indicating no pain, to 10, indicating severe pain. Functional disability was assessed using the validated Indonesian version of the Oswestry Disability Index (ODI), consisting of 10 items addressing the impact of pain on daily activities. ODI scores were expressed as percentages and categorized according to the instrument's established interpretation.⁹

The referral diagnosis of lumbar HNP was accepted as the medical diagnosis available to the authors. However, the available records did not contain the source referral document, magnetic resonance imaging (MRI) findings, or a formal neurological examination. Consequently, the specific anatomical level of the disc lesion could not be confirmed. Physiotherapy examination identified tenderness at the L5–S1 region, muscle spasm involving the erector spinae, quadratus lumborum, piriformis, and gluteus maximus, painful lumbar and hip movements, and positive Straight Leg Raise (SLR) at 50°, Bragard test, and Neri test. These findings were considered suggestive of possible lumbosacral neural irritation or involvement but were not interpreted as confirmation of a specific neurological level.¹ The physiotherapy diagnosis was based on the documented impairments and functional findings, including pain, restricted ROM, muscle spasm, quadriceps weakness, and positive neural provocation tests. Differential diagnoses considered from the clinical findings included lumbar spondylolisthesis and lumbar spondylosis. Formal neurological assessment of motor, sensory, reflex, and cauda equina findings was not documented.¹

The patient's physiotherapy assessment was organized according to the International Classification of Functioning, Disability and Health (ICF) framework. Impairments included pain, restricted lumbar and hip ROM, muscle spasm, and quadriceps weakness. Activity limitations included difficulty walking, changing position, and transitioning from sitting to standing. Participation restrictions

involved prayer activities and household activities. Treatment goals were therefore directed toward reducing pain and muscle spasm, improving ROM and muscle strength, and supporting activity and participation.

The patient received four physiotherapy sessions over two weeks, with each session reported in the clinical documentation as approximately 45 minutes. The intervention program consisted of infrared, TENS, manual therapy, stretching, therapeutic exercise, strengthening, and ADL training. The same intervention program was reportedly provided during sessions 1–4 without documented progression or modification. The detailed treatment parameters are presented in Table 2.

Table 2. Multimodal physiotherapy intervention protocol for sessions 1–4

No.	Intervention	Patient position	Parameters/intensity	Duration	Repetitions/sets	Sequence	Sessions 1–4/progression
1	Infrared	Not specifically documented	Distance 40 cm from skin; specific intensity not documented	10 min	Once/session	1	Sessions 1–4; no modification documented
2	TENS	Prone lying	15 mA; 100 Hz; pulse duration 100 μ s; adjusted to patient tolerance	10 min	Once/session	2	Sessions 1–4; no modification documented
3	Connective tissue release and NMT	Comfortable position	Pressure adjusted according to tolerance and response	5 min	Once/session	3	Sessions 1–4; no modification documented
4	Stretching exercise	Not specifically documented	According to tolerance; not performed to the point of increased pain	5 min	3 repetitions $\times$ 8 counts	4	Sessions 1–4; no modification documented
5	Bugnet exercise	Side-lying	Adjusted to patient ability and performed in a controlled manner	3 min	3 repetitions $\times$ 8 counts	5	Sessions 1–4; no modification documented
6	McKenzie exercise	Not specifically documented	Lumbar extension according to tolerance	3 min	3 repetitions $\times$ 8 counts	6	Sessions 1–4; no modification documented
7	William Flexion Exercise	Not specifically documented	Adjusted according to patient tolerance	2 min	6 repetitions $\times$ 10 counts	7	Sessions 1–4; no modification documented
8	Lumbar elongation	Not specifically documented	Adjusted according to tolerance and pain response	2 min	3 repetitions	8	Sessions 1–4; no modification documented
9	Lumbar traction	Prone lying	Specific intensity not documented	3 min	3 repetitions	9	Sessions 1–4; no modification documented
10	Bridging exercise	Supine with knees flexed	Controlled pelvic elevation	3 min	3 repetitions $\times$ 8 counts	10	Sessions 1–4; no modification documented
11	Quadriceps and hamstring strengthening	Not specifically documented	Adjusted according to patient ability	Not specifically documented	3 repetitions $\times$ 8 counts	11	Sessions 1–4; no modification documented
12	Activities of daily living training	Adapted to activity	Adjusted according to patient ability	5 min	1 repetition	12	Sessions 1–4; no modification documented

Infrared was applied to the lumbar region for 10 minutes at a distance of 40 cm from the skin. The specific infrared intensity and patient positioning were not documented. TENS was applied once during each session for 10 minutes at a frequency of 100 Hz, pulse duration of 100 μ s, and intensity of 15 mA. The electrodes were positioned over the L5–S1 region and muscles reported to have spasms. Intensity was adjusted according to patient tolerance and was not intended to cause discomfort. The available documentation did not specify the electrode dimensions or exact electrode configuration.

Manual therapy consisted of connective tissue release and neuromuscular technique (NMT) using an elbow technique, with pressure adjusted according to patient tolerance and response. Stretching was directed toward the erector spinae, quadratus lumborum, and gluteal muscles. Bugnet exercise was performed in a side-lying position, while McKenzie exercise consisted of lumbar extension according to tolerance. William Flexion Exercise was included to address lumbar mobility and flexibility. Lumbar elongation and lumbar traction were also administered during each session. Bridging exercise was performed in a supine position with the knees flexed, followed by controlled pelvic elevation. Strengthening exercises targeted the quadriceps and hamstrings. ADL training included transitions from lying to sitting, sitting to standing, and prayer-related movements.

The home program consisted of bridging exercise, McKenzie exercise, and self-stretching, performed daily at home with three repetitions of eight counts for approximately three minutes. The patient also received education regarding bed mobility, appropriate lifting techniques, and avoidance of excessive lumbar flexion. The intervention program remained unchanged across all four sessions. No progression or modification of the modality selection, technical parameters, intensity, duration, repetitions/sets, or sequence was documented during the intervention period.

The primary outcomes were changes in pain intensity, functional disability, ROM, and muscle strength between the baseline assessment and the post-intervention assessment after session 4. Pain was assessed using VAS, functional disability using ODI, ROM using goniometric AROM measurements, and muscle strength using MMT. Data were analyzed descriptively by comparing pre-intervention and post-intervention measurements. No inferential statistical analysis was performed because this was a single-subject case report. ODI change was interpreted as an observed change rather than according to a minimum clinically important difference (MCID), because the appropriateness of a specific MCID threshold for this individual case was not established.¹⁰

The intervention was delivered as part of routine outpatient physiotherapy practice. Oral informed consent for clinical assessment and treatment was obtained from the patient before the clinical procedures. Separate written informed consent for publication of the case report was obtained before manuscript preparation. Patient identity was protected throughout the reporting process. The available documentation does not state whether the case report received institutional ethics committee approval, exemption, or waiver. This status therefore requires confirmation from the responsible institution before final publication. Patient

adherence to the home program, treatment-related adverse events, and patient perspective regarding the treatment experience were not systematically documented. No post-treatment follow-up beyond session 4 was available.

Results

The patient completed four physiotherapy sessions over a two-week period. Outcome measurements were obtained at baseline before the intervention and after completion of the fourth session. The evaluated outcomes included pain intensity, functional disability, active range of motion (AROM) of the lumbar spine and hip, and muscle strength. Because measurements were not systematically collected after each individual session, the results describe the change between the initial assessment and the final assessment only. No follow-up assessment after the fourth session was available.

Pain intensity and functional disability were assessed to describe changes in the patient's symptoms and activity-related limitations following the intervention period. Pain was evaluated using the Visual Analog Scale (VAS), including resting pain, tenderness, and movement-related pain, while functional disability was assessed using the Oswestry Disability Index (ODI). The baseline and post-intervention findings are presented in Table 3.

Table 3. Changes in pain intensity and functional disability

Outcome	Pre-intervention	Post-intervention
Resting pain	3	0
Tenderness	8	5
Movement-related pain	6	4
ODI	30% (moderate)	20% (mild)

Note: Pain intensity was assessed using the VAS (0–10). Functional disability was assessed using the ODI.

As shown in Table 3, all assessed pain outcomes decreased after the four-session intervention. Resting pain decreased from 3 to 0, indicating that no resting pain was reported at the final assessment. Tenderness decreased from 8 to 5, while movement-related pain decreased from 6 to 4, indicating that pain remained present during palpation and movement at the end of the observation period. The ODI score decreased from 30% to 20%, corresponding to an observed change of 10 percentage points. The ODI category changed from moderate disability to mild disability based on the scoring interpretation used in the manuscript. This observed change was interpreted descriptively rather than against an MCID threshold.

Changes in lumbar and hip AROM were evaluated to describe mobility following the intervention period. Measurements were recorded using the neutral-zero method and expressed in degrees. The results for the assessed lumbar and hip movements are presented in Table 4.

Table 4. Changes in active range of motion of the lumbar spine and hip

Region and movement	Pre-intervention	Post-intervention
Lumbar spine		
Flexion–extension	25°–0°–50°	25°–0°–60°
Lateral flexion, left/right	25°–0°–25°	25°–0°–25°
Rotation, left/right	18°–0°–18°	18°–0°–18°
Hip		
Flexion–extension, left	5°–0°–50°	5°–0°–55°
Flexion–extension, right	5°–0°–51°	5°–0°–57°
Abduction–adduction, left	30°–0°–50°	30°–0°–50°
Abduction–adduction, right	30°–0°–50°	30°–0°–50°

Note: AROM, active range of motion. Values are presented using the neutral-zero method as extension°–neutral 0°–flexion°.

The principal mobility changes occurred in flexion. Lumbar flexion increased from 50° to 60°, while hip flexion increased from 50° to 55° on the left and from 51° to 57° on the right. Lumbar extension, lateral flexion, and rotation remained unchanged between assessments. Similarly, hip abduction and adduction remained unchanged bilaterally. Thus, the observed mobility changes were limited primarily to lumbar and hip flexion, while the other assessed movement directions showed no change during the observation period.

Muscle strength was assessed using MMT to determine whether changes occurred in the muscle groups examined before and after the intervention. The results are presented in Table 5.

Table 5. Changes in muscle strength assessed using Manual Muscle Testing

Muscle group	Pre-intervention	Post-intervention
Trunk flexors	5	5
Trunk extensors	5	5
Quadriceps	4	5
Hamstrings	5	5

Note: MMT, Manual Muscle Testing; score range 0–5.

The quadriceps was the only assessed muscle group that demonstrated a change in MMT score, increasing from 4 at baseline to 5 after the fourth session. Trunk flexors, trunk extensors, and hamstrings remained at an MMT score of 5 at both assessments. Therefore, the observed change in muscle strength was limited to the quadriceps, while the other assessed muscle groups maintained their baseline strength.

Overall, the post-intervention assessment demonstrated reductions in resting pain, tenderness, and movement-related pain, together with a reduction in ODI score. Improvements in AROM were observed primarily in lumbar flexion and bilateral hip flexion, while other assessed movements remained unchanged. Quadriceps strength increased from MMT 4 to 5, whereas the other assessed muscle groups remained unchanged. These findings represent observed pre-intervention to post-intervention changes over the four-session treatment period and should not be interpreted as evidence of a causal treatment effect. The absence of serial measurements, a comparator, and long-term follow-up limits interpretation of the temporal pattern and durability of these changes.

Discussion

The present case describes observed changes following four sessions of multimodal physiotherapy over two weeks in a 55-year-old woman with a referral diagnosis of chronic lumbar HNP. The patient initially presented with low back pain radiating to both lower extremities, restricted lumbar and hip movement, muscle spasm, quadriceps weakness, and limitations in walking, positional

transitions, sit-to-stand activities, and prayer. Following the intervention period, reductions were observed in resting pain, tenderness, and movement-related pain, accompanied by a lower ODI score. Improvements were also observed in lumbar and bilateral hip flexion and quadriceps muscle strength. Because the intervention consisted of multiple modalities delivered concurrently and there was no comparator, these findings represent observed clinical changes rather than evidence of the effectiveness of any individual intervention or of the multimodal program as a causal treatment.

The reduction in pain was observed across all three assessed pain conditions. Resting pain decreased from 3 to 0, while tenderness decreased from 8 to 5 and movement-related pain decreased from 6 to 4. TENS was included as one component of the intervention and is commonly used as an adjunctive modality for pain management.¹¹ However, the present case cannot determine whether the reduction in pain was attributable to TENS because infrared, manual therapy, therapeutic exercise, functional training, and the home program were provided during the same treatment period. In addition, the natural course of lumbar disc-related symptoms and contextual factors associated with clinical care may have contributed to the observed changes.² Therefore, the findings should be interpreted as a change occurring during multimodal physiotherapy rather than as evidence of a specific analgesic effect of TENS.

Functional disability also decreased during the observation period. The ODI score changed from 30% to 20%, representing an observed change of 10 percentage points, with the corresponding category changing from moderate to mild disability according to the scoring interpretation used in this report. This change occurred alongside reductions in pain and improvements in selected ROM measures. Nevertheless, no MCID threshold was applied because the suitability of a specific threshold for interpreting this individual case was not established. Furthermore, the absence of serial ODI measurements prevents determination of when the change occurred during the four-session intervention. The observed reduction therefore indicates improvement in the measured disability score but does not establish the clinical importance or durability of the change.⁹

Changes in ROM were predominantly observed in flexion. Lumbar flexion increased from 50° to 60°, while hip flexion increased from 50° to 55° on the left and from 51° to 57° on the right. Lumbar extension, lateral flexion, and rotation remained unchanged, as did hip abduction and adduction. Several components of the intervention could plausibly have contributed to changes in mobility, including stretching, manual therapy, McKenzie exercise, William Flexion Exercise, and other therapeutic exercises.⁵ However, because these interventions were administered together, their individual contributions cannot be separated. The improvement in flexion should therefore be interpreted as an observed change in mobility during the treatment period rather than as evidence that a particular exercise or manual technique produced the change.

The inclusion of McKenzie exercise was based on the clinical objective of addressing lumbar movement and symptoms according to patient tolerance. In patients with appropriate directional preference, repeated lumbar movements may influence symptom distribution and functional movement. However, the present case did not include systematic documentation of directional preference or serial assessment of symptom centralization. Consequently, the observed improvement in lumbar flexion cannot be attributed specifically to McKenzie exercise. Similarly, lumbar traction was included as part of the treatment program, but its contribution to the observed outcomes cannot be isolated.⁵ These considerations are particularly important because the patient did not undergo serial assessments that could demonstrate a temporal relationship between a specific intervention and a specific clinical response.

The improvement in quadriceps strength from MMT 4 to 5 was the only observed change in the assessed muscle groups. Trunk flexors, trunk extensors, and hamstrings remained at MMT 5 throughout the observation period. The strengthening program included quadriceps and hamstring exercises, while bridging and other therapeutic exercises were also provided. The improvement in quadriceps strength may therefore reflect the combined effects of repeated exercise, improved movement tolerance, or variation associated with manual muscle testing. Because MMT is an ordinal clinical measure and only two assessment points were available, the magnitude and mechanism of this change cannot be determined from the present case.¹²

The clinical assessment also identified positive SLR, Bragard, and Neri tests, together with pain radiating to both lower extremities. These findings may be compatible with lumbosacral neural irritation, but they do not establish a specific neurological level or independently confirm lumbar disc herniation.^{1,13} Importantly, the available records did not contain MRI findings or a formal neurological examination assessing motor, sensory, and reflex function or cauda equina signs.¹ The diagnosis of lumbar HNP was therefore treated as a referral diagnosis, while the physiotherapy diagnosis was based on the documented impairments and functional limitations. This distinction is essential because the case cannot provide radiological or neurological confirmation of the anatomical level of disc involvement.

The main strength of this case is the detailed description of a multimodal physiotherapy program applied to a patient with chronic symptoms and multiple functional limitations. The intervention included thermal therapy, TENS, manual therapy, therapeutic exercise, strengthening, functional training, and home exercise. Such a description may provide clinically relevant information about how multiple interventions can be integrated according to documented impairments and activity limitations in routine outpatient practice.⁷ Nevertheless, the case has substantial limitations. All interventions were delivered concurrently, preventing attribution of outcomes to individual modalities. There was no control or comparator, and the observed changes may also reflect natural history, spontaneous recovery, regression toward the mean, contextual effects, or the home program.² Outcome assessment was performed only at baseline and after the fourth session, preventing analysis of changes across individual sessions. Adherence to the home program and treatment-related adverse events were not systematically documented, and no long-term follow-up was available. Patient perspective regarding treatment experience, perceived benefit, comfort, and satisfaction was also not systematically collected.

Overall, the present case demonstrates observed improvements in pain, selected ROM measures, quadriceps strength, and ODI score after four sessions of multimodal physiotherapy over two weeks. These findings provide a descriptive account of clinical change in an individual patient but do not establish a causal relationship between the intervention and the observed outcomes. Further prospective studies with standardized diagnostic assessment, serial outcome measurements, clearly documented intervention parameters, appropriate comparison groups, and longer follow-up are required to evaluate the effectiveness and durability of multimodal physiotherapy for lumbar HNP.

Conclusion

Four sessions of multimodal physiotherapy over two weeks were associated with observed improvements in several clinical outcomes in a 55-year-old woman with a referral diagnosis of chronic lumbar HNP. Resting pain decreased from 3 to 0, tenderness from 8 to 5, and movement-related pain from 6 to 4. The ODI score decreased from 30% to 20%, representing an observed change of 10 percentage points. Lumbar flexion increased from 50° to 60°, hip flexion increased from 50° to 55° on the left and from 51° to

57° on the right, and quadriceps strength improved from MMT 4 to 5. Other assessed ROM and muscle strength measures remained unchanged.

These findings provide a descriptive account of clinical changes observed during a four-session multimodal physiotherapy program. Because multiple interventions were administered concurrently, without a comparator or long-term follow-up, the observed changes cannot be attributed to any specific modality or interpreted as evidence of causal treatment effectiveness. Further studies with standardized diagnostic assessment, serial outcome measurements, appropriate comparison groups, and longer follow-up are needed to evaluate the effectiveness and durability of multimodal physiotherapy for lumbar HNP.

Author Contribution

Rezky Izzati Afiah: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing, Original Draft, and Visualization.

Yusfina: Supervision, Conceptualization, Methodology, and Writing, Review and Editing.

Djohan Aras: Supervision and Investigation.

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Conflict of Interest Statement

The authors declare no conflict of interest.

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Ethics Statement

Written informed consent for publication of this case report was obtained from the patient before manuscript preparation. Patient confidentiality and anonymity were maintained throughout the preparation and reporting of the case. The available documentation does not specify whether institutional ethics committee approval, exemption, or waiver was obtained for this case report. The corresponding author should confirm the applicable institutional ethical status before final submission.

References

1. Pojskic M, Bisson E, Oertel J, Takami T, Zygourakis C, Costa F. Lumbar disc herniation: epidemiology, clinical and radiologic diagnosis WFNS spine committee recommendations. *World Neurosurg* X. 2024;22:100279.
2. Yaman O, Guchkha A, Vaishya S, Zileli M, Zygourakis C, Oertel J. The role of conservative treatment in lumbar disc herniations: WFNS spine committee recommendations. *World Neurosurg* X. 2024;22:100277.
3. Du S, Cui Z, Peng S, Wu J, Xu J, Mo W, et al. Clinical efficacy of exercise therapy for lumbar disc herniation: a systematic review and meta-analysis of randomized controlled trials. *Front Med (Lausanne)*. 2025;12:1531637.
4. Verville L, Hincapié CA, Southerst D, Yu H, Bussi  res A, Gross DP, et al. Systematic review to inform a World Health Organization (WHO) clinical practice guideline: benefits and harms of transcutaneous electrical nerve stimulation (TENS) for chronic primary low back pain in adults. *J Occup Rehabil*. 2023;33(4):651-660.
5. Thavarajasingam SG, Ramsay DSC, Namireddy SR, Kamath AG, Kanakala S, Zaidi H, et al. Exercise, manipulation and traction physiotherapy in the conservative management of lumbar disc herniation: a systematic review and meta-analysis. *Brain Spine*. 2025;5:105632.
6. Arslan S,   lger   . The effect of exercise in the treatment of lumbar disc herniation: a systematic review. *Acta Neurol Belg*. 2025;125(5):1209-1224.
7. Taheri A, Adibi P, Abbasi A, Sabbagh Jaffari M, Rahimi A. Analysis of the reporting requirements of clinical case reports dedicated journals: towards updating the CARE guideline. *Adv Biomed Res*. 2023;12:41.
8. Spirina MA, Vlasova TI, Sitdikova AV, Sergachev AV, Chatkin VV, Mezhnov AE. Neurophysiological substantiation and validity assessment of manual muscle testing in clinical practice: a literature review. *Vopr Kurortol Fizioter Lech Fiz Kult*. 2024;102(4):70-77.
9. Koivunen K, Widbom-Kolhanen S, Perna   K, Arokoski J, Saltychev M. Reliability and validity of Oswestry Disability Index among patients undergoing lumbar spinal surgery. *BMC Surg*. 2024;24(1):13.
10. Kumar R, Alostaz M, Bansal A, Varley E, Nemani V, Leveque JC, et al. Describing functional low back pain disability in the American population: a crowd-sourced evaluation of the Oswestry Disability Index. *Spine J*. 2024;24(11):2165-2171.
11. Verville L, Hincapi   CA, Southerst D, Yu H, Bussi  res A, Gross DP, et al. Systematic review to inform a World Health Organization (WHO) clinical practice guideline: benefits and harms of transcutaneous electrical nerve stimulation (TENS) for chronic primary low back pain in adults. *J Occup Rehabil*. 2023;33(4):651-660.
12. Itoh S, Tanikawa H, Kondo H, Ozeki S, Ito T, Fujimura K, et al. Minimal detectable change in muscle strength measurements obtained using a hand-held dynamometer in patients with stroke. *Jpn J Compr Rehabil Sci*. 2025;16:9-18.
13. Nee RJ, Coppieters MW, Boyd BS. Reliability of the straight leg raise test for suspected lumbar radicular pain: a systematic review with meta-analysis. *Musculoskelet Sci Pract*. 2022;59:102529.