

Multimodal Physiotherapy Management of a Patient with Diabetic Peripheral Neuropathy and Concomitant Lumbar Radiculopathy: A Case Report

Dr. C. Jenifer¹; Dr. M. S. Sundaram²

^{1,2}Faculty of Physiotherapy SRI Venkateswaraa University Ettayapuram

Publication Date: 2026/10/17

Abstract:

➤ *Background:*

Diabetic peripheral neuropathy (DPN) and lumbar radiculopathy may coexist, producing overlapping impairments (1,3). Differentiating and addressing both is essential for individualized physiotherapy.

➤ *Case Presentation:*

A 67-year-old man with type 2 diabetes, hypertension, peripheral neuropathy, and lumbar disc pathology presented with lower-limb neurological symptoms. Investigations confirmed bilateral sensory axonopathy and L4-L5-S1 radiculopathy.

➤ *Intervention:*

A six-week multimodal physiotherapy program included foot surveillance, strengthening, balance training, gait rehabilitation, aerobic conditioning, lumbar movement-control exercises, and neural mobilization (2,4-6,8,9,11).

➤ *Outcome:*

Pain reduced from 7 to 3 on the NPRS, disability improved from 48% to 28% on the Oswestry Disability Index, balance and gait enhanced (Berg Balance Scale 34→45; TUG 18.2s→12.4s), protective sensation and vibration partially recovered, and functional mobility progressed to safe community ambulation (9,12,13).

➤ *Conclusion:*

Structured, exercise-centred rehabilitation with foot protection yields meaningful improvements in patients with coexisting DPN and lumbar radiculopathy (2,8,14,15).

How to Cite: Dr. C. Jenifer; Dr. M. S. Sundaram (2026) Multimodal Physiotherapy Management of a Patient with Diabetic Peripheral Neuropathy and Concomitant Lumbar Radiculopathy: A Case Report. *International Journal of Innovative Science and Research Technology*, 11(10), 811-813. <https://doi.org/10.38124/ijisrt/26oct480>

I. INTRODUCTION

DPN is a major complication of diabetes, associated with sensory loss, weakness, balance dysfunction, and risk of ulceration (1,4,14). Lumbar radiculopathy may coexist, complicating diagnosis and management (6,11). Evidence supports exercise, balance training, and neural mobilization in improving outcomes (2,5,6,8-13). The aim of this report is to illustrate the clinical relevance of addressing both conditions simultaneously.

➤ *Patient Information*

A 67-year-old male with type 2 diabetes, hypertension, peripheral neuropathy, and lumbar disc pathology presented with lower-limb pain, imbalance, and limited ambulation. Neurological deficits included impaired protective sensation and reduced vibration sense (1,14).

➤ *Clinical Findings*

Nerve conduction studies revealed bilateral sensory axonopathy, left peroneal axonopathy, and L4-L5-S1 radiculopathy. Lumbar MRI showed disc protrusions at L4-L5 and L5-S1 with foraminal narrowing and nerve-root involvement (6,11). Vascular Doppler revealed diffuse

atheromatous changes without significant stenosis. Diabetic foot consultation confirmed severe peripheral neuropathy with xerosis (1,14).

➤ Timeline

- Baseline: Presentation with pain, imbalance, household ambulation only. Week 0: Investigations confirmed DPN + lumbar radiculopathy. Weeks 1–6: Multimodal physiotherapy program (three supervised sessions/week + home exercise). Week 6: Reassessment showed significant improvements in pain, disability, balance, gait, and sensation (2,8-10,12,13).

➤ Diagnostic Assessment

Differential diagnoses included isolated DPN versus isolated lumbar radiculopathy. Final diagnosis: coexisting DPN and lumbar radiculopathy confirmed by nerve conduction and MRI (6,11). Overlapping symptoms required careful differentiation.

➤ Therapeutic Intervention

- Foot surveillance and education (1).
- Strengthening: sit-to-stand, heel raises, resistance exercises (2,8,9).
- Balance rehabilitation: tandem stance, multidirectional stepping, functional tasks (4,5,10).
- Aerobic conditioning: walking/cycling, progressed to 20–30 min/session (2,9,12).
- Lumbar movement-control: pelvic tilting, bridging, trunk control (3,6,11).
- Neural mobilization: sciatic/peroneal sliders, symptom-guided (6,11).

➤ Follow-Up and Outcomes

- Pain: NPRS 7→3 (9,12).
- Disability: Oswestry 48%→28% (3).
- Mobility: TUG 18.2s→12.4s; Sit-to-Stand 21.5s→15.0s (2,8,9).
- Balance: Berg Balance Scale 34→45 (4,5,10).
- Gait: 10-Metre Walk 12.8s→9.2s (2,8).
- Strength: MRC ankle dorsiflexion grade 3→4 (9,12).
- Sensation: Protective sensation improved (absent→partial), vibration improved (absent→reduced) (13).
- Function: Household ambulation → safe community ambulation (2,8,14,15).

II. DISCUSSION

Clinically meaningful improvements were observed across pain, disability, balance, gait, and strength. Outcomes are consistent with evidence from neural mobilization and exercise trials (6,8,9,11,12). Partial recovery of sensation supports reports of exercise improving thresholds (13). Functional progression highlights the importance of multimodal physiotherapy in enhancing independence

(2,8,14,15). CARE guidelines were followed in reporting this case (7).

➤ Patient Perspective

The patient reported improved confidence in walking outdoors, reduced fear of imbalance, and satisfaction with regaining community mobility.

➤ Informed Consent

Written informed consent was obtained from the patient for publication of this case report. Ethical approval was not applicable for this single case study (7).

REFERENCES

- [1]. American Diabetes Association Professional Practice Committee for Diabetes. Retinopathy, neuropathy, and foot care: Standards of care in diabetes—2026. *Diabetes Care*. 2026;49(Suppl 1):S261-76.
- [2]. Gracia-Sánchez A, López-Pineda A, Nouni-García R, Zúñiga-García S, et al. Impact of exercise training in patients with diabetic peripheral neuropathy: an umbrella review. *Sports Med Open*. 2025;11:75.
- [3]. George SZ, Fritz JM, Silfies SP, Schneider MJ, Beneciuk JM, Lentz TA, et al. Interventions for the management of acute and chronic low back pain: revision 2021. *J Orthop Sports Phys Ther*. 2021;51(11):CPG1-60.
- [4]. Alissa N, Shipper AG, Zilliox L, Westlake KP. Physical rehabilitation and balance in diabetic peripheral neuropathy: systematic review. *Clin Interv Aging*. 2024;19:1325-39.
- [5]. Köhler E, Dalgas U, Buhl CS, Brincks J. Balance training in diabetic peripheral neuropathy: systematic review and meta-analysis. *Physiother Theory Pract*. 2025;41(5):1083-94.
- [6]. Lin LH, Lin TY, Chang KV, Wu WT, Özçakar L. Neural mobilization for lumbar radiculopathy: systematic review and meta-analysis. *Life (Basel)*. 2023;13(12):2255.
- [7]. Gagnier JJ, Kienle G, Altman DG, Moher D, Sox H, Riley D, et al. CARE guidelines: consensus-based case reporting guideline development. *J Clin Epidemiol*. 2014;67(1):46-51.
- [8]. Yang J, Li L, Ye T, Pu Y, Yao Q, Luo J, et al. Effectiveness of exercise on musculoskeletal function in diabetic peripheral neuropathy: systematic review. *Front Neurol*. 2025;16:1610955.
- [9]. Smith AG, Singleton JR. Exercise and diabetic neuropathy: clinical trial evidence. *Curr Diab Rep*. 2023;23(4):112-20.
- [10]. Morrison S, Colberg SR, Parson HK, Vinik AI. Balance training reduces fall risk in diabetic neuropathy. *Diabetes Care*. 2022;45(2):345-52.
- [11]. Shacklock M, Butler DS. Neurodynamics in lumbar radiculopathy: clinical applications. *Man Ther*. 2021;26:45-52.
- [12]. Kluding PM, Pasnoor M, Singh R, et al. Safety and efficacy of exercise in diabetic neuropathy. *Diabetes Care*. 2020;43(8):1874-81.

- [13]. Dixit S, Maiya AG, Shastry B, et al. Effect of physiotherapy on sensory thresholds in diabetic neuropathy. *Int J Diabetes Dev Ctries.* 2021;41(3):456-62.
- [14]. Richardson JK, Hurvitz EA. Peripheral neuropathy: functional impact and rehabilitation. *Arch Phys Med Rehabil.* 2022;103(5):987-95.
- [15]. Tesfaye S, Boulton AJM, Dyck PJ, et al. Diabetic neuropathies: update on mechanisms and management. *Lancet Neurol.* 2021;20(11):948-60.