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Effectiveness of the GLA:D back program in a patient with radiating leg pain without nerve involvement: A case report

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Abstract
Background: Low back pain (LBP) may present with radiating leg pain without nerve root involvement. Identifying the mechanism of pain is important for appropriate conservative management. GLA: D Back integrates education and exercise with a biopsychosocial approach.
Methods: A clinical assessment was conducted on a 48-year-old female housewife with chronic LBP and radiating pain on the right side to the knee for 4 months. Nociceptive referred pain was suggested by the findings, without neurologic deficits or neuropathic features. The patient participated in the GLA: D Back program, consisting of an initial individual assessment, two structured patient education sessions, sixteen supervised exercise sessions over eight weeks, and a final reassessment.
Results: The patient experienced a reduction in activity-related pain, disability and fear-avoidance, and an improvement in functional performance. Improvements were sustained at 1- and 3-month follow-up.
Conclusion: This case report suggests that the GLA: D Back program can be an effective and safe intervention for individuals with chronic low back pain accompanied by radiating leg pain without nerve involvement. Structured education combined with supervised exercise may improve pain, function, and psychosocial outcomes in this patient population.

Keywords: Radiating leg pain, GLA: D Back, Nociceptive pain, pain intensity, disability, fear-avoidance beliefs, and functional performance

Introduction

Low back pain (LBP) is indeed a widespread health concern affecting people across all age groups. It's a major contributor to disability worldwide, with significant implications for both individuals and healthcare systems. The percentage of people experiencing low back pain at a given moment is approximately 12%. Approximately 60% of individuals with low back pain (LBP) who seek care in primary care settings also have associated radiating leg pain [1].

Radiating leg pain can either be a type of radicular pain where a nerve root is involved or it can be a somatic referred pain where other structures are involved as ligaments, facet joints, and muscles of the fascia [7].

The Good Life with Osteoarthritis in Denmark (GLA: D) program has been originally developed and implemented in Denmark for people with Osteoarthritis. Subsequently GLA: D Back has been developed, which is a structured intervention for patients with persistent and/or recurrent LBP consisting of patient education and supervised exercises. It takes into account patients 'beliefs and behaviors regarding their LBP through education and through guidance to use exercises to restore normal and varied movements [2].

Nociceptive referred pain typically presents as dull, aching, poorly localized pain that radiates but does not follow a dermatomal pattern and is not accompanied by neurological deficits. In contrast, neuropathic pain presents with sharp, shooting, burning sensations and objective neurological signs [7].

Differentiating nociceptive referred pain from neuropathic or radicular pain is clinically important because pain mechanisms may influence assessment, education, treatment selection, and prognosis. Clinical features, symptom behavior, neurological examination, and neurodynamic testing can assist in determining the predominant presentation [7].

Studies have been done earlier to investigate whether patients with LBP with radiating leg pain show similar post treatment outcomes as compared to patients without radiating leg pain after participation in the GLA: D Back program.

This case report describes the clinical presentation, classification, intervention, and three-month outcomes of a patient with chronic low back pain and radiating leg pain clinically consistent with nociceptive referred pain who participated in the GLA: D Back program.

Case presentation

Participant

A 48-year-old female homemaker presented with chronic low back pain radiating to the right buttock and posterior thigh up to the knee for four months. Symptoms developed gradually without trauma. Lumbar pain was constant, dull, and aching, whereas radiating pain was intermittent. Symptoms increased with prolonged standing, repetitive household bending, and sustained forward bending and reduced with rest and positional change.

She denied numbness, tingling, burning, electric shock-like pain, lower-limb weakness, and bowel or bladder symptoms. Activity-related pain was 7/10 on the Numerical Pain Rating Scale (NPRS), with no resting pain. The patient had diabetes mellitus under medical supervision.

Clinical Examination

Standing observation demonstrated asymmetrical shoulders and increased lumbar lordosis. Tenderness and mild-to-moderate muscle spasm were noted in the erector spinae, gluteal, transversus abdominis, and oblique musculature. An antalgic gait was observed.

The presentation was clinically consistent with nociceptive referred pain. Radiating symptoms remained predominantly in the buttock and posterior thigh, with clear aggravating and easing factors. No prominent dysesthesia or neurological deficit was identified, and neurological and neurodynamic examinations did not indicate nerve-root involvement.

Predefined criteria for diagnosing nociceptive pain:

Nociceptive pain refers to pain that is associated with actual or threatened damage to non neural tissue and involves the activation of peripheral nociceptors

Predominant pain mechanism: Buttock pain will be more than the leg pain

If no evidence during neurological and neurodynamic examinations to suggest the presence of neuropathic pain and in presence of consistent and proportional symptoms then the predominant mechanism is probably nociceptive [7].

- Presence of 3 symptoms
  Intermittent pain
  Localised
  Clear Aggravating/easing factors

- Absence of 3 symptoms
  Burning
  Dysesthesia
  Night pain

- 1 Sign
  Antalgic postures and movement patterns.

Intervention

The GLA: D Back program was delivered over eight weeks and consisted of one initial assessment, two individualized education sessions, 16 supervised one-hour exercise sessions twice weekly, and one final reassessment. Follow-up assessments were performed at one and three months [2].

Education included information regarding low back pain, prognosis, pain mechanisms, physical and psychosocial factors, reassurance regarding imaging and treatment, activity modification, pain management, physical activity, and self-management [2].

Fig 1: Patient education session

Exercises included back awareness, pelvic tilting, lumbar rotation, arm and whole-body movements, followed by progressive strengthening of the back extensors, abdominal muscles, lateral hip muscles, trunk rotators, posterior hip muscles, and lower limbs. Flexibility and stretching exercises were also incorporated. Exercise intensity was progressed according to symptoms, ability, and functional performance [2].

Fig 2: Supervised exercise session

Outcome Measures

Outcomes were recorded at baseline, post-intervention, one month, and three months using NPRS, ODI, Fear-Avoidance Beliefs Questionnaire (FABQ), standing forward bending test, back extensor endurance, trunk flexor endurance, and sit-to-stand performance.

Results

The patient demonstrated progressive and clinically meaningful improvements across all performance-based tests and patient-reported outcome measures following participation in the GLA: D Back program, with sustained benefits observed at 1-month and 3-month follow-up.

Performance-Based Outcomes

Table 1: Performance-Based Outcomes

Performance based test	Pre	Post	1month	3 month
Standing forward bending test	10cm	5cm	4cm	2.4cm
Back extensor endurance test	15 sec	40 sec	56 sec	63sec
Trunk flexor endurance test	35.3 sec	45 sec	50 sec	59 sec
Sit to stand test	10 reps	14 reps	16 reps	17 reps

Functional performance improved consistently over time. Lumbar flexibility, as assessed by the standing forward bending test, showed a marked reduction in fingertip-to-floor distance from 10 cm at baseline to 5 cm post-intervention, with further improvement to 4 cm at 1 month and 2.4 cm at 3 months, indicating improved lumbar mobility and reduced movement-related pain.

Back extensor endurance increased substantially from 15 seconds at baseline to 40 seconds immediately post-program, progressing further to 56 seconds at 1 month and 63 seconds at 3 months, reflecting enhanced trunk extensor strength and endurance.

Similarly, trunk flexor endurance improved from 35.3 seconds pre-intervention to 45 seconds post-intervention, with continued gains at follow-up (50 seconds at 1 month and 59 seconds at 3 months). Functional lower limb strength and endurance, measured by the sit-to-stand test, improved from 10 repetitions at baseline to 14 repetitions post-intervention, increasing to 16 repetitions at 1 month and 17 repetitions at 3 months.

Patient-Reported Outcome Measures

Table 2: Patient-Reported Outcome Measures

Outcome measures	Before	After	1 month	3 month
NPRS	R-0	R-0	R- 0	R- 0
	A- 7	A- 4	A- 3	A- 2
ODI	65.2	42	38.6	20
FABQ	22	18	8	6

Pain intensity during activity (NPRS) decreased from 7/10 at baseline to 4/10 post-intervention, with further reduction to 3/10 at 1 month and 2/10 at 3 months, while pain at rest remained absent throughout follow-up. This indicates effective pain modulation without symptom exacerbation.

Functional disability, measured using the Oswestry Disability Index (ODI), improved from 65.2% (severe disability) at baseline to 42% post-intervention, progressing to 38.6% at 1 month and 20% at 3 months, reflecting a shift from severe to minimal disability.

Psychosocial factors also showed notable improvement. Fear-avoidance beliefs, assessed using the FABQ, reduced from 22 at baseline to 18 post-intervention, with substantial improvement at follow-up (8 at 1 month and 6 at 3 months), indicating reduced fear related to movement and physical activity.

Discussion

This case report demonstrates that the GLA: D Back program was effective in reducing pain, disability, and fear-avoidance behaviors while improving functional performance in a patient with radiating leg pain without nerve involvement. The findings support the clinical utility of a structured education and exercise-based approach for managing nociceptive referred leg pain associated with persistent low back pain.

The patient's presentation was consistent with nociceptive referred pain, characterized by intermittent, localized, dull aching pain radiating to the buttock and posterior thigh without dermatomal distribution or neurological deficits. The absence of neuropathic features such as burning pain, paresthesia, or positive neurodynamic tests further supported this classification. Recognizing the pain mechanism was essential in guiding appropriate management.

The observed reduction in pain intensity and disability aligns with the core principles of the GLA: D Back program, which emphasizes understanding pain as a consequence of load exceeding physical and psychosocial capacity rather than structural damage. Patient education likely played a critical role in reducing fear and catastrophizing, as reflected by the substantial reduction in FABQ scores. Improved pain-related beliefs may have facilitated greater engagement in movement and exercise, contributing to functional recovery.

Improvements in trunk flexor and extensor endurance suggest enhanced spinal stability and load tolerance, which are important for daily functional activities such as bending, standing, and transitional movements. The progressive improvement seen at 1-month and 3-month follow-up indicates that the benefits of the program were not limited to the supervised phase but were sustained over time, likely due to improved self-efficacy and adherence to active coping strategies.

The reduction in antalgic movement patterns and improvement in sit-to-stand performance further indicate restoration of functional capacity and confidence in movement. These findings support earlier research suggesting that patients with radiating leg pain without nerve involvement can achieve outcomes comparable to those without leg pain when managed using an active, biopsychosocial approach such as GLA:D Back.

This case highlights the importance of differentiating nociceptive referred pain from neuropathic pain in patients presenting with radiating symptoms. When appropriately classified, patients with radiating leg pain without nerve involvement can respond favorably to education-based exercise programs, avoiding over-medicalization and fostering long-term self-management.

Conclusion

The GLA: D back program proved to be an effective intervention for a patient with chronic low back pain and radiating leg symptoms without nerve involvement. The program resulted in meaningful reductions in pain and disability while improving functional capacity and self-management. This case supports the use of GLA: D Back as a safe and effective conservative management option for similar clinical presentations.

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Conflict of Interest

There is no conflict of interest related to the preparation, conduct, or publication of this case report.

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