

Original Article

The Importance of Pilates in the Management of Chronic Nonspecific Low Back Pain - Case Study

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Abstract

Chronic nonspecific low back pain reduces functional capacity and quality of life, being a leading cause of disability in adults. The Pilates method, through deep muscle activation and postural control, is a promising non-pharmacological intervention for this condition. A 49-year-old female with chronic nonspecific low back pain completed an individualized, progressively adapted contemporary Pilates program over twelve weeks, with two to three sessions weekly. Pain intensity, functional disability, fear of movement, and spinal mobility were assessed at baseline, after six weeks, and after twelve weeks. Pain intensity decreased by 62.5 percent, functional disability improved from a severe to a minimal level, and fear of movement was substantially reduced, along with gains in spinal mobility and postural alignment. The contemporary Pilates method appears effective and safe for chronic nonspecific low back pain, warranting further research on larger samples.

1. Introduction

Chronic nonspecific low back pain is among the leading causes of disability worldwide, contributing substantially to the global burden of musculoskeletal conditions (Briggs et al., 2018; Hoy et al., 2015). The burden of low back pain varies across regions, age groups, and sexes (Wang et al., 2022), while musculoskeletal conditions, including low back pain, remain major contributors to years lived with disability worldwide (GBD 2019 Diseases and Injuries Collaborators, 2020). Chronic nonspecific low back pain is a prevalent condition that affects functional capacity and quality of life, being one of the main causes of disability in adults, with its prevalence and associated disability varying across populations and clinical settings (Alfalogy, Mahfouz, Elmedany, Hariri, & Fallatah, 2023; Aminde et al., 2020; Malta et al., 2017). It is also a frequent reason for seeking

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healthcare, and its management is influenced by care-seeking patterns and by the information patients receive at the initial consultation (Ferreira et al., 2010; Mørso et al., 2022). Clinically, the condition is characterized by symptoms that cannot be attributed to a specific underlying pathology after appropriate clinical assessment (Airaksinen et al., 2006). In the context of the need for effective non-pharmacological interventions, current clinical guidelines recommend individualized, exercise-based approaches as a first-line option for chronic nonspecific low back pain (Airaksinen et al., 2006). Among these, the Pilates method has gained popularity due to its emphasis on deep muscle activation, postural control, and conscious movement. Ultrasound-based studies have examined transversus abdominis activation during popular trunk-Pilates exercises in women (Tsartsapakis, Gerou, Zafeiroudi, & Kellis, 2023), and the indications, benefits, and risks of Pilates for people with chronic low back pain have been evaluated by Pilates-trained physical therapists (Wells, Kolt, Marshall, & Bialocerkowski, 2014).

This study explores the applicability of the contemporary Pilates method in a case of chronic nonspecific low back pain, with the main objective of reducing pain and improving mobility, kinesiophobia, and postural alignment.

2. Material and methods

Purpose and Hypotheses. The purpose of this study was to evaluate the effectiveness of a contemporary Pilates rehabilitation program in reducing pain intensity, functional disability, and kinesiophobia, and in improving spinal mobility and postural alignment, in a patient with chronic nonspecific low back pain, a condition recognized as a leading cause of disability worldwide (GBD 2021 Low Back Pain Collaborators, 2023). It was hypothesized that a structured, progressively adapted 12-week Pilates program would produce clinically relevant improvements across these outcome measures, in line with the exercise-based approach recommended for chronic nonspecific low back pain (Airaksinen et al., 2006).

Research Design and Justification. A single-case study design was chosen because it allows an in-depth, individualized examination of the therapeutic process, including the adaptation of exercise progression to the patient's clinical presentation, which is often not captured in group-level trial designs. This design is particularly suited to documenting real-world clinical practice and generating hypotheses for future controlled research. Prior to enrollment, the participant received a complete explanation of the study procedures and provided written informed consent, in accordance with ethical standards for research involving human subjects.

Subjects. The subject of this case study was a 49-year-old female diagnosed with chronic nonspecific low back pain (CNSLBP) persisting for more than 12 months. She works in a predominantly sedentary environment, spending approximately 8–9 hours daily sitting at a desk. The patient reported recurrent lumbar discomfort, stiffness, and occasional radiating pain in the left gluteal region. Her medical history showed no structural spinal pathology (disc herniation, tumor, or fracture), and no neurological deficits were present, which supported the

classification of the condition as nonspecific (Airaksinen et al., 2006). Lifestyle factors included limited physical activity, prolonged static posture, and muscle imbalance characterized by weak abdominal and spinal extensors and tight hip flexors and hamstrings.

Applied Tests. The following instruments were applied at baseline, after 6 weeks, and after 12 weeks:

- Visual Analog Scale (VAS) for pain intensity;
- Oswestry Disability Index (ODI) for functional disability, a widely used measure of back-related disability in chronic nonspecific low back pain (Elabd, Oakley, & Elabd, 2024);
- Tampa Scale for Kinesiophobia (TSK) for fear of movement, given that fear-avoidance beliefs have been identified among the predictors of disability related to chronic low back pain (Alamam, Moloney, Leaver, Alsobayel, & Mackey, 2019);
- Schober and Ott tests for lumbar and thoracic spinal mobility;
- Postural analysis using static observation and dynamic alignment tests.

At baseline, the assessment indicated a VAS score of 8/10, an ODI score of 60% (severe disability), and evident anterior pelvic tilt with shortened hip flexors and weakened core stabilizers. The results suggested impaired lumbopelvic control and reduced mobility of the lumbar spine, confirming the clinical diagnosis of chronic nonspecific low back pain (Fig. 1).

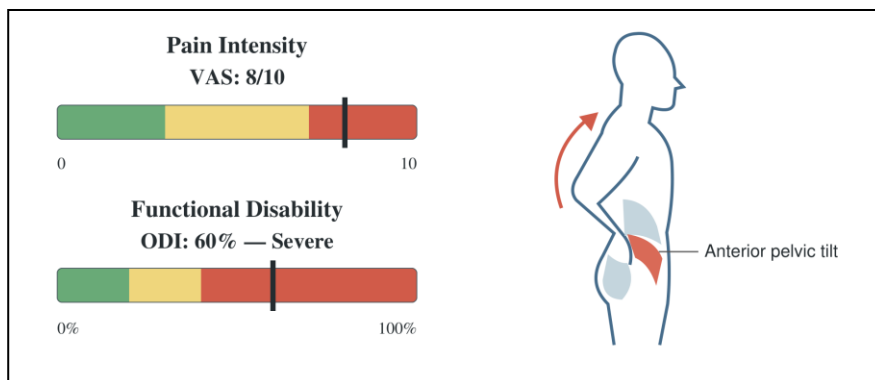


Figure 1. Postural assessment illustrating anterior pelvic tilt (initial evaluation).

Experimental Procedure. An individualized 12-week contemporary Pilates rehabilitation program was implemented, consisting of two to three sessions per week, each lasting sixty minutes (Table 1). The program progressed through three sequential phases: an initial phase (weeks 1–4), centered on breathing control and mat-based exercises to activate deep abdominal stabilizers; an intermediate phase (weeks 5–8), introducing Reformer-based footwork and core-stabilization exercises of increasing complexity; and an advanced phase (weeks 9–12), incorporating hip and pelvic stability work, spinal articulation, and integration exercises, concluding

with a stretching and cool-down block.

The sessions were conducted under the direct supervision of the author, a licensed physiotherapist and certified Pilates instructor, using both Mat and Reformer equipment. The intervention was designed to enhance lumbar spine mobility, lumbopelvic stability, and postural control through a gradual and functionally adapted progression tailored to the participant's physical capacity. The structure of the program followed the fundamental principles of the BASI Pilates method, which integrates the physical, cognitive, and psychological dimensions of movement. The approach emphasized the synchronization of breathing with movement to activate the deep stability center, concentration to improve segmental control and precision, and conscious muscular engagement to ensure biomechanically correct execution. Centering on the lumbopelvic complex served as the foundation for global stability, while precision and flow promoted continuity, balance, and harmony in movement. Through the cultivation of body awareness, neuromuscular coordination, and energetic efficiency, the program sought to integrate body, mind, and breath into a coherent and mindful movement process that supports optimal postural alignment and functional recovery.

Table 1. *Intervention protocol – contemporary Pilates program (12 weeks, 2–3 sessions per week)*

Block / Equipment	Exercises	Physiological purpose / Target	Repetitions
Warm-up & Breathing (Mat)	Pelvic Curl, Spine Twist Supine, Chest Lift, Chest Lift with Rotation	Activation of deep abdominal muscles (transversus abdominis, multifidus); improvement of spinal mobility and breathing control	8–10 reps each
Footwork (Reformer)	Parallel Heels, Parallel Toes, V-Toes, Open V-Heels, Calf Raises, Single Leg Heels, Single Leg Toes	Strengthening of hip and knee extensors, improvement of dynamic postural alignment, ankle dorsiflexion and plantarflexion control	8–10 reps per leg
Abdominal & Core Work (Reformer)	Hundred Prep, Coordination	Core stabilization, coordination of breathing with movement, activation of deep stabilizing muscles	8–10 reps
Hip and Pelvic Stability (Reformer)	Frog, Circles Down/Up, Openings	Strengthening of adductors and hip extensors; improvement of pelvic-lumbar control and hip mobility	8–10 reps
Spinal Articulation & Integration (Reformer)	Bottom Lift, Elephant, Down Stretch, Swan Basic	Posterior chain activation, spinal articulation, extension control, scapular stability	8–10 reps each
Stretching & Cool-down (Reformer / Mat)	Standing Lunge, Side Kneeling Stretch	Lengthening of hip flexors and hamstrings; improvement of postural balance and flexibility	8–10 reps / hold 10–15 s

3. Results and Discussions

After twelve weeks of systematic Pilates-based rehabilitation, the participant demonstrated clinically relevant improvements (Table 2; Fig. 2). Pain intensity, measured using the Visual Analog Scale (VAS), decreased from 8 points at baseline to 5 points at six weeks and 3 points at twelve weeks, a 62.5% reduction compared to baseline values. Functional disability, assessed with the Oswestry Disability Index (ODI), decreased from 60% (severe disability) at baseline to 40% (moderate disability) at six weeks and 20% (minimal disability) at twelve weeks, indicating substantial improvement in the participant's ability to perform daily activities. The Tampa Scale for Kinesiophobia (TSK) score decreased from 45 to 35 and then to 25 points, a reduction of 44.4%, reflecting reduced fear of movement, increased confidence and motor control.

Table 2. Comparative evolution of pain, disability, and kinesiophobia scores (T0 – baseline, T1 – 6 weeks, T2 – 12 weeks)

Indicator	T0	T1	T2	Change (T0→T2)
VAS (0–10)	8	5	3	–62.5%
ODI (%)	60 (severe)	40 (moderate)	20 (minimal)	–66.7%
TSK (17–68)	45	35	25	–44.4%

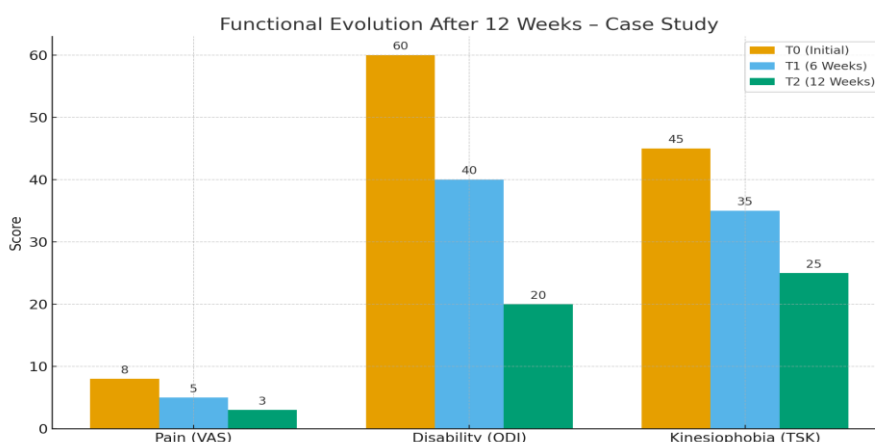


Figure 2. Evolution of pain intensity (VAS), functional disability (ODI), and kinesiophobia (TSK) scores at baseline (T0), 6 weeks (T1), and 12 weeks (T2).

Objective measurements using the Schober and Ott tests indicated measurable gains in lumbar and thoracic spine mobility, confirming enhanced flexibility and segmental movement control. Postural assessment revealed the restoration of neutral pelvic alignment, reduction of thoracic kyphosis, and improved muscular endurance of the core and paraspinal stabilizers.

Functionally, the participant reported increased ease of movement in daily tasks, reduced fatigue during prolonged sitting, and improved sleep quality. Psychologically, there was a marked increase in body awareness, self-efficacy, and confidence in movement.

Discussions

The results of this case study are consistent with international clinical guidelines, which recommend supervised, individualized exercise therapy as a first-line, non-pharmacological approach for chronic nonspecific low back pain (Airaksinen et al., 2006). The observed reductions in pain intensity and disability after the twelve-week Pilates program support this recommendation, although a single case cannot establish effectiveness.

These outcomes are consistent with the use of Pilates as an exercise approach that targets the deep trunk stabilizers, as examined by ultrasound imaging of the transversus abdominis during trunk-Pilates exercises (Tsartsapakis et al., 2023), and that Pilates-trained physical therapists consider relevant for people with chronic low back pain (Wells et al., 2014). Through the activation of deep stabilizing muscles and the integration of controlled breathing, Pilates is thought to promote neuromuscular re-education, improved sensorimotor coordination, and functional movement efficiency.

The pronounced decrease in kinesiophobia observed in this case is particularly relevant, given that fear-avoidance beliefs have been identified among the predictors of disability in chronic low back pain (Alamam et al., 2019). By combining graded exposure to movement with body-awareness training, the contemporary Pilates method may address this psychological barrier, in addition to pain intensity.

The participant's occupational profile, with prolonged static sitting for eight to nine hours daily, is consistent with evidence linking sitting behaviour to low back pain among sedentary office workers (Bontrup et al., 2019), which reinforces the clinical relevance of postural and movement-based interventions in sedentary populations.

The improvement in flexibility and reduction of hip flexor tightness likely decreased lumbar compression forces, while the participant's ability to maintain a neutral spinal alignment contributed to postural equilibrium and pain prevention. Overall, the findings suggest that a structured, individualized Pilates program can reduce pain, improve spinal mobility, and restore functional and postural balance in chronic low back pain rehabilitation.

These results should nonetheless be interpreted with caution. The follow-up was limited to twelve weeks, whereas long-term studies of chronic low back pain are needed to establish whether such improvements are maintained (Dutmer et al., 2022), and quality of life in chronic low back pain may differ by sex (Pericot-Mozo et al., 2024), which limits the generalization of findings from this single female case. Moreover, the absence of a control condition and the dual role of the treating physiotherapist as both intervention provider and assessor introduce a risk of bias that future controlled studies on larger samples should address.

4. Conclusions

This case study suggests that the contemporary Pilates method is an effective therapeutic approach for the management of chronic nonspecific low back pain. The twelve-week individualized program was followed by a 62.5% reduction in pain intensity, an improvement in functional disability from a severe to a minimal level, and a decrease in kinesiophobia from 45 to 25 points, together with improved spinal mobility, postural correction, and overall well-being. Pilates should be considered a valuable component of physiotherapeutic intervention programs aimed at restoring functional stability and preventing recurrences in patients with chronic lumbar pain.

Given the limitations of a single-case design, including the absence of a control group, these results should be regarded as hypothesis-generating. Further research on larger, controlled samples is needed to confirm the effectiveness of the contemporary Pilates method in chronic nonspecific low back pain.

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Authors' Contributions: Mihaela Vasilescu was responsible for the study conception and design, participant assessment, Pilates intervention, data collection, and manuscript preparation. She conducted the literature review, performed data interpretation, and drafted the final version of the article.

Conflicts of Interest. The authors declare no conflicts of interest.

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