



Joint Hypermobility During Pregnancy and Functional Improvement with Clinical Pilates Based Exercise: A Case Report

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Abstract

Pregnancy-associated joint hypermobility can compromise musculoskeletal stability, impair function, and reduce quality of life, yet safe, effective interventions are scarce. We report a case of a pregnant patient with symptomatic hypermobility who completed a structured Clinical Pilates program targeting core control, postural alignment, and movement efficiency. Over the course of the intervention, the patient exhibited marked improvements in functional mobility, spinal stability, and overall comfort, without adverse events. This case demonstrates that low-load, movement-based exercise can safely enhance musculoskeletal function during pregnancy, offering a practical, non-pharmacological approach for managing connective tissue laxity. These findings underscore the potential of Clinical Pilates as a rehabilitative strategy in maternal health and provide a foundation for future studies exploring structured exercise interventions in vulnerable populations.

Keywords: Hypermobility; Pregnancy; Pilates; Core stability

Introduction

Pregnancy involves a series of endocrine, anatomical, and biomechanical adaptations that allow fetal development while progressively modifying maternal physiology. These changes affect not only body structure but also neuromuscular coordination, load distribution, and connective tissue behavior across the musculoskeletal system. As pregnancy advances, mechanical demands on the lumbopelvic region increase and may lead to pain, reduced functional capacity, and altered movement patterns, particularly during the later stages of gestation [1, 2].

One of the hormones involved in these adaptations is relaxin. During early pregnancy, relaxin promotes connective tissue remodeling and increases ligamentous compliance, facilitating pelvic expansion for childbirth. Serum levels typically rise during the first trimester and later stabilize while contributing to cardiovascular adjustments such as vasodilation and increased blood volume. Although these changes are physiologically necessary, they may also increase ligamentous laxity in some individuals. In susceptible patients this can reduce passive joint stability and alter proprioceptive feedback, especially in those with preexisting generalized joint hypermobility [3, 4].

Generalized joint hypermobility refers to joint movement beyond the expected physiological range when adjusted for age, sex, and ethnicity. It is often associated with intrinsic variations in collagen structure and connective tissue integrity [3]. Epidemiological studies suggest that hypermobility affects approximately ten percent of Western populations and may reach up to twenty five percent in some ethnic groups, with a higher prevalence in women. During pregnancy, the coexistence of baseline hypermobility and hormonally mediated ligamentous relaxation may increase mechanical stress on the lumbopelvic region. This interaction has been associated with low back pain, pelvic girdle pain, altered gait, and decreased neuromuscular stability [4].

Despite the high frequency of pregnancy related musculoskeletal symptoms, therapeutic strategies that specifically address the interaction between gestational biomechanics and hypermobility remain limited. Exercise interventions that emphasize controlled movement, stabilization, and proprioceptive awareness may offer a useful clinical approach [5].

Clinical Pilates (CP) is characterized by controlled movement, trunk stabilization, coordinated breathing, and postural alignment. It has been increasingly incorporated into rehabilitation and

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prenatal exercise programs [6]. Evidence from non pregnant populations suggests that CP based exercise can improve neuromuscular control, balance, and postural stability [7]. However, its role in addressing functional instability associated with pregnancy related ligamentous laxity in hypermobile individuals has not been widely investigated.

Mind body exercises such as CP are commonly recommended for individuals with symptomatic hypermobility because they promote body awareness, controlled movement, and gradual strengthening [8, 9]. Previous research has demonstrated benefits of CP for chronic low back pain [10], fibromyalgia [11], and other chronic musculoskeletal conditions [12-14]. Nevertheless, evidence specifically focusing on hypermobility remains scarce and only a limited number of single subject studies have been reported [15].

Understanding how targeted neuromuscular conditioning may influence stability and functional performance during pregnancy in hypermobile individuals is clinically relevant. The aim of this case report is to describe the functional progression of a pregnant patient with generalized joint hypermobility and pregnancy related musculoskeletal symptoms following a structured CP intervention.

Methodology

Study Design

This study was conducted as a retrospective case report. The participant was a 39-year-old pregnant woman with a previous history of generalized joint hypermobility who presented with pregnancy related low back pain, pelvic girdle discomfort, and reduced core stability.

Clinical Profile and Medical History: The patient reported long standing joint hypermobility and intermittent musculoskeletal discomfort that increased during pregnancy. Prior to pregnancy she maintained an active lifestyle and had some experience with CP exercises.

At the time of participation, she was receiving routine prenatal care and had been medically cleared to perform supervised low to moderate intensity physical activity.

Functional diagnoses included symptomatic generalized joint hypermobility, pregnancy related low back pain, pelvic girdle pain, lumbopelvic instability, and altered gait patterns associated with impaired neuromuscular control.

Procedures: A clinical history review was conducted to document musculoskeletal symptoms, functional limitations, and previous exercise experience.

The exercise intervention consisted of a structured CP program adapted to pregnancy. Sessions included breathing exercises and gentle mobility movements during the warm up phase. Core activation and lumbopelvic stabilization exercises were introduced progressively with emphasis on controlled cross body movements and gluteal activation. Additional exercises focused on lower limb mobility and strengthening while maintaining safe joint alignment. Postural awareness and balance tasks were also incorporated to enhance proprioceptive feedback and motor control.

Results and Discussion

Following the intervention period, the patient reported a reduction in perceived pain and improved functional mobility in

daily activities. Improvements were also observed in lumbopelvic stability, postural control, and movement confidence during exercise performance. Although statistical analysis was not applicable due to the single case design, descriptive comparisons between pre and post intervention observations suggested meaningful functional improvement.

These findings are consistent with previous research showing that therapeutic exercise is an effective strategy for improving pain and disability in individuals with symptomatic hypermobility. Because hypermobile joints depend less on passive ligamentous support, neuromuscular control plays a key role in maintaining joint alignment and functional movement. Exercise programs that emphasize stabilization may therefore compensate for reduced passive stability [9, 10].

CP focuses on trunk stabilization, breathing coordination, and controlled movement. Activation of stabilizing muscles such as the transversus abdominis and pelvic floor may improve load distribution across the lumbopelvic region, which may explain the improvements in functional stability observed in this patient. In addition, individuals with hypermobility often present reduced proprioception and altered motor control strategies [9]. Mind body approaches such as CP promote body awareness and controlled movement, potentially improving sensorimotor integration and joint positioning during daily activities.

Previous systematic reviews have reported that CP can reduce pain and improve physical function in individuals with chronic low back pain and other musculoskeletal conditions [10-14]. Although these studies were not conducted in pregnant populations, the principles of stabilization and motor control remain relevant. Similar benefits have also been reported in individuals with generalized joint hypermobility [15].

Psychological factors may also influence functional recovery. Chronic pain is frequently associated with fear of movement and reduced activity levels. CP based exercise has been shown to reduce kinesiophobia and encourage safe movement, which may contribute to improved functional participation [16-18]. Mind body exercise programs have also been associated with improvements in quality of life and overall, well being in individuals with chronic pain conditions [19].

This study represents a single case report and the findings cannot be generalized to larger populations. In addition, no long term follow up was conducted, so it is unknown whether the improvements were maintained throughout the remainder of pregnancy or postpartum.

Despite these limitations, this case highlights the potential role of CP as a supportive intervention for pregnant individuals with hypermobility related symptoms. Early identification of joint hypermobility may also be important, as targeted neuromuscular training such as CP could help improve joint stability, enhance motor control, and better prepare individuals for the physical and biomechanical changes associated with pregnancy.

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