



Improving Function in Chronic Lower Extremity Lymphedema Through Clinical Pilates: A Case Study

De la Fuente-Reynoso AL^{1*}, Dyall J¹, Peña-Zermeño LV¹, Menna A² and Adamyk T¹

¹Swivero Pilates Studio, Ajax, Canada

²Assistant Professor, University of Niagara Falls, Canada



Abstract

Background: Chronic lower extremity lymphedema is a progressive condition characterized by persistent swelling, discomfort, heaviness, impaired mobility, and functional limitations. These symptoms may substantially affect balance, gait, physical activity, and quality of life. Although exercise is increasingly recognized as an important component of lymphedema management, evidence regarding the use of individualized Clinical Pilates in patients with chronic lower extremity lymphedema remains limited.

Objective: This case study aimed to evaluate the effects of a supervised Clinical Pilates intervention on edema-related symptoms, lower extremity function, functional mobility, balance, pain, and overall physical well-being in a patient with chronic lower extremity lymphedema secondary to breast cancer.

Methods: A case study design was used to document the patient's response to an individualized Clinical Pilates program. The intervention consisted of six one-on-one sessions performed once weekly under professional supervision. Exercises were individually adapted to the patient's clinical presentation and included controlled lower extremity movements, muscle activation, diaphragmatic breathing, postural alignment, balance training, core control, and progressive functional movements. Clinical observations and patient-reported changes in symptoms and physical function were documented throughout the intervention.

Results: Following completion of the six-session intervention, the patient demonstrated improvements in lower extremity mobility, balance, walking ability, and overall physical comfort. The patient also reported reduced swelling-related discomfort, improved perception of lower extremity circulation, and greater ease during functional movement. Improvements in physical confidence and tolerance for movement were also observed. No adverse events were reported during the intervention.

Conclusion: This case study suggests that individualized Clinical Pilates may be a feasible adjunctive exercise approach for addressing functional limitations and symptoms associated with chronic lower extremity lymphedema. The findings support further investigation of structured Clinical Pilates interventions using larger samples and controlled study designs to determine their clinical effectiveness and potential role within multidisciplinary lymphedema rehabilitation.

Keywords: Lymphedema; Lower Extremity; Clinical Pilates; Functional Mobility; Balance; Breast Cancer

Introduction

Lymphedema is a chronic disorder of lymphatic transport characterized by the accumulation of protein-rich interstitial fluid and progressive tissue swelling. Beyond the visible enlargement of the affected limb, persistent lymphedema may be accompanied by pain, heaviness, skin changes, impaired mobility, balance disturbances, and reduced physical function, with a substantial impact on daily activities and quality of life. Cancer and its treatment are major causes of secondary lymphedema in Western countries, while vascular disorders such as Deep Vein Thrombosis (DVT) may further compromise lower-limb function [1-4].

Breast cancer is the most commonly diagnosed cancer among women worldwide, and improvements in detection and treatment have resulted in a growing population of long-term

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*Correspondence:

Amparo Leticia De la Fuente-Reynoso,
Swivero Pilates Studio, Ajax, Canada,
E-mail: amparodelafuenter@gmail.com

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survivors. Nevertheless, many survivors experience persistent treatment-related complications, including lymphedema, fatigue, and impaired physical function, which may limit participation in daily activities and affect quality of life [5-7].

Exercise-based rehabilitation is increasingly incorporated into the care of breast cancer survivors. Pilates has received particular attention because it combines controlled muscle activation, flexibility, postural control, breathing, and balance within a structured movement programme. Previous studies in breast cancer populations have reported improvements in lumbopelvic stability, physical function, balance, and upper-extremity outcomes following Pilates-based interventions [8-13]. Recent evidence has also suggested potential benefits in cognitive domains, although these findings remain preliminary [14-17].

Evidence regarding rehabilitation strategies for chronic lower-limb lymphedema remains limited, particularly in patients with a history of breast cancer and additional vascular comorbidities. This represents an important clinical gap, as longstanding lower-limb lymphedema may progressively restrict mobility and independence despite conventional management [18]. Individualized rehabilitation approaches that account for functional capacity, symptom burden, and comorbidities may therefore provide a useful adjunct to established lymphedema care.

To our knowledge, the clinical course of an older adult with chronic bilateral lower-limb lymphedema following breast cancer treatment during an individualized Clinical Pilates programme has not been described. We therefore report the short-term clinical course of a 78-year-old woman with a 30-year history of bilateral lower-limb lymphedema, previous DVT, and breast cancer treated with surgery and radiotherapy. The case focuses on changes in lower-limb swelling, pain, mobility, balance, posture, and walking ability following six supervised Clinical Pilates sessions. Rather than establishing treatment efficacy, this report documents the observed clinical response and feasibility of an individualized movement-based approach in a patient with longstanding lymphedema and a complex vascular history.

Materials and Methods

Study design

This report presents a single-patient case study describing the effects of a Clinical Pilates intervention in an older adult with chronic lower-limb lymphedema. Given the descriptive nature of the study and the inclusion of only one participant, no statistical analyses were performed.

Participant

The participant was a 78-year-old woman with a 30-year history of bilateral lower-extremity lymphedema, with greater severity in the left leg. Her medical history was also significant for Deep Vein Thrombosis (DVT) and breast cancer previously treated with surgery and radiotherapy (Figure 1).

At baseline, the patient reported persistent swelling, pain, a sensation of tightness and heaviness in both lower limbs, reduced mobility, fatigue, skin changes, difficulty walking, and impaired balance. These symptoms substantially affected her functional mobility and activities of daily living.



Figure 1: Visual changes in lower-extremity lymphedema following the Clinical Pilates intervention. Representative photographs of the patient's affected lower limb at baseline in March 2026 (a) and following the intervention in May 2026 (b), showing a visible reduction in lower-limb swelling and improved overall appearance of the affected extremity.

Clinical Pilates Intervention

The participant attended individualized one-to-one Clinical Pilates sessions supervised by a certified Clinical Pilates instructor. Sessions were performed approximately once per week, and six sessions had been completed at the time of this report.

The intervention emphasized lower-limb circulation, mobility, postural control, balance, and functional movement. Exercises were individually adapted to the patient's clinical presentation and tolerance. The foot pumping exercise ("Pumping Feet") was incorporated regularly throughout the intervention to facilitate lower-limb muscle activation and promote venous and lymphatic return.

Outcome assessment

Changes following the Clinical Pilates intervention were evaluated using patient-reported outcomes and serial photographic documentation. Standardized photographs were obtained before the initiation of treatment (March) and after completion of the six Clinical Pilates sessions (May). Patient-reported outcomes focused on perceived changes in lower-limb swelling, pain, mobility, balance, walking ability, flexibility, posture, circulation, and ease of movement. Given the descriptive nature of this single-patient case study, no statistical analyses were performed.

Ethical considerations

The patient provided written informed consent for participation and for the publication of anonymized clinical information and clinical photographs. All identifying information was removed to protect patient confidentiality.

Results

The participant completed all six scheduled one-to-one Clinical Pilates sessions without adverse events and demonstrated progressive clinical improvement throughout the intervention period.

The most notable patient-reported outcome was a reduction in lower-limb swelling, particularly around the ankles. The participant described this improvement as the most meaningful change experienced during the intervention. She also reported a subjective improvement in lower-limb circulation, accompanied by a reduction in pain, increased flexibility, and greater ease of movement during daily activities.

Functional improvements were also observed. The participant reported enhanced balance, improved walking ability, and better postural control, which contributed to increased confidence during ambulation. These changes were associated with a perceived reduction in physical effort during movement and an overall improvement in mobility.

Serial clinical photographs obtained before the intervention (March) and after completion of the sixth Clinical Pilates session (May) demonstrated visible reductions in lower-limb swelling, with the most apparent changes observed around the ankles. The photographs also suggested an improvement in skin coloration and the overall appearance of both lower extremities, consistent with the participant's subjective reports.

Overall, the findings from this case suggest that a short course of individualized Clinical Pilates was associated with clinically meaningful improvements in symptoms and functional capacity in this patient with long-standing bilateral lower-limb lymphedema. Although causal inferences cannot be drawn from a single case, the observed changes support further investigation of Clinical Pilates as a complementary rehabilitation strategy for individuals with chronic lymphedema.

Discussion and Conclusion

Exercise has become an integral component of cancer rehabilitation, with accumulating evidence supporting its benefits for physical function, fatigue, and quality of life among breast cancer survivors. Pilates has received increasing attention because it combines controlled movement with breathing, postural control, and progressive muscle activation. Previous studies have reported improvements in mobility, balance, upper-extremity function, psychological well-being, and more recently cognitive performance following Pilates interventions in women treated for breast cancer [19]. In this patient, the reduction in lower-limb swelling observed over the six-session intervention, together with improvements in pain, mobility, balance, flexibility, and walking ability, supports a beneficial role for individualized Clinical Pilates as part of the rehabilitation process. Repeated activation of the lower-limb musculature, combined with controlled breathing, postural work, and functional movement, may have promoted lymphatic and venous return and contributed to the reduction in swelling and associated symptoms. The consistency of these changes across several clinical domains suggests that Clinical Pilates may have benefits that extend beyond symptom management alone.

Clinical Pilates should not be considered a substitute for medical or lymphedema-specific treatment but rather a potential adjunct to multidisciplinary rehabilitation. Its emphasis on lower-limb muscle activation, postural control, balance, functional movement, and breathing may contribute to mobility and independence while supporting venous and lymphatic return. Repeated activation of the calf musculature may enhance the skeletal muscle pump, while diaphragmatic breathing and controlled trunk activation may facilitate lymphatic flow. These mechanisms are physiologically plausible but remain speculative in the absence of objective measures of lymphatic function [20, 21].

The present case study should be interpreted within the context of its limitations. As a single case study, it cannot establish treatment efficacy or causal relationships. Outcomes were primarily based on patient-reported experience and photographic documentation,

and objective measures such as limb volume, bioimpedance, tissue composition, or validated functional assessments were not obtained. In addition, the relatively short follow-up does not allow conclusions regarding the durability of the observed improvements.

Despite these limitations, this case highlights the feasibility of delivering individualized Clinical Pilates to an older adult with chronic lower-limb lymphedema after breast cancer treatment and provides preliminary clinical observations that support further investigation. Future prospective studies incorporating objective measures of lymphatic function, standardized patient-reported outcomes, and adequately powered controlled designs will be necessary to determine whether the improvements observed here can be reproduced and to define the role of Clinical Pilates within multidisciplinary lymphedema rehabilitation.

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