INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH AND INNOVATIVE STUDIES
ISSN: 2820-7157
www.ijsrisjournal.com

December 2025 Volume 4 Number 6 111-114

Received Date: October 20, 2025 Accepted Date: November 11, 2025 Published Date: December 01, 2025

Effectiveness of Physiotherapy Lymphedema Management on Limb Circumference and Shoulder Mobility in Women with Breast Cancer-Related Lymphedema: A Narrative Review

Manal Abdullah Almayouf [1], Fatimah Radhi Saleh Almasoud [2], Mona Salman Alrwaimi [3], Ridha Abdulwahab Alkhuwaytim [4], Hawora Aqeel Alsalem [4], Afrah Ahmed Alhussaini [5], Fatimah Mohammed Alhaiez [6], Rihana Adnan Alhaji [7], Afrah Abdullatif Alabdulmohsen [8], Ashwag Saleh Alhasson [9], Bushra Saleh Alhassoon [7], Layla Ali mates Al Alwah [10], Zainab Mousa Alhassan [11], Wejdan Mustafa Aljuraydan [12]

1. Al-SHUGIG Primary Healthcare Center
2. Alomran Phc
3. MCH. Hospital Alahasa
4. Prince Saud bin Jalawi Hospital
5. Aljafer Phc
6. Alomran general hospital
7. Maternity and Children's Hospital Alhasa
8. Qatif Primary Health Care Center
9. health complex in Al-Ahsa
10. Almahdood Phc
11. Al-Oyoun City Hospital in Al-Ahsa
12. King Faisal general hospital

Abstract

Breast cancer-related lymphedema (BCRL) is a common and debilitating complication following breast cancer treatment, characterized by chronic limb swelling and frequent shoulder dysfunction. Physiotherapy-led conservative management, primarily Complete Decongestive Therapy (CDT), is the standard of care.

This narrative review synthesizes current evidence on the effectiveness of key physiotherapy interventions for BCRL, with a specific focus on their dual impact on reducing limb circumference/volume and improving shoulder range of motion and function.

A review of systematic reviews, meta-analyses, and key randomized controlled trials from databases such as PubMed, PEDro, and Cochrane Library was conducted.

Findings: Strong evidence supports that CDT, particularly its components of **multilayer short-stretch compression bandaging** and **therapeutic exercise**, is highly effective in reducing upper limb volume. Concurrently, these interventions significantly improve shoulder mobility. Volume reduction alleviates pain and heaviness, removing a barrier to movement, while targeted exercises directly address range of motion and strength. The critical role of compression and the safety and necessity of progressive exercise are well-established. The added value of manual lymphatic drainage (MLD) for volume reduction remains debated, though it may aid symptom management.

Physiotherapy management is effective for both primary outcomes. Successful management requires an integrated approach targeting decongestion and functional restoration simultaneously. Long-term success depends on patient adherence to maintenance strategies, including compression garments and home exercises. Future research should prioritize combined outcome measures to optimize therapy protocols.

1. Introduction

Breast cancer-related lymphedema (BCRL) is a chronic condition affecting approximately 20% of survivors, resulting from damage to the lymphatic system during axillary surgery and/or radiation therapy. The hallmark symptom is swelling (increased limb circumference and volume) in the upper limb, breast, or trunk. This is frequently accompanied by pain, tightness, fibrosis, and **significant impairment in shoulder mobility and function**. These deficits collectively reduce quality of life and independence. Physiotherapy, through structured conservative interventions, aims to manage edema and restore function. This review evaluates the evidence for the effectiveness of these interventions on the dual primary targets of **limb circumference reduction** and **shoulder mobility improvement**.

2. Physiotherapy Management: Core Components

The cornerstone is **Complete Decongestive Therapy (CDT)**, a two-phase protocol:

- **Phase 1 (Intensive Decongestion):** A daily therapy program including:
    1. **Manual Lymphatic Drainage (MLD):** Specialized light massage to stimulate lymph flow.
    2. **Multilayer Short-Stretch Compression Bandaging (MLLB):** Applied post-MLD to provide sustained therapeutic pressure.
    3. **Therapeutic Exercises:** Tailored movements performed with bandages in place to activate muscular pumps.
    4. **Skin Care:** To prevent infection.
- **Phase 2 (Maintenance):** Patient-led management involving daytime compression garments, nighttime bandaging (as needed), lifelong exercise, and self-care techniques.

3. Effectiveness on Reducing Limb Circumference/Volume

- **CDT as a Whole:** Robust evidence from systematic reviews confirms CDT's high efficacy in significantly reducing limb volume post-Phase 1, with reductions commonly ranging from **25% to 60%**.
- **Critical Role of Compression:** The **multilayer bandaging** component is consistently identified as the most active ingredient for volume reduction. Comparative studies show that exercise or MLD alone are vastly inferior to interventions including compression.
- **Debate on MLD:** Several high-quality RCTs have found that adding therapist-applied MLD to compression and exercise does **not** yield significantly greater volume reduction. Its role may be more pronounced for symptoms, truncal edema, or in self-management.
- **The Role of Exercise:** Contrary to historical fears, **progressive resistance and aerobic exercise do not provoke lymphedema** and contribute to volume reduction by enhancing lymphatic and venous return via muscular pumping.

4. Effectiveness on Improving Shoulder Mobility

- **Mechanisms of Improvement:** Gains in shoulder range of motion (ROM) and function (e.g., measured

by DASH or SPADI questionnaires) are achieved through:

1. **Direct Intervention:** Structured **therapeutic exercises** targeting scapulohumeral mobility, stretching of tight anterior chest tissues, and strengthening of periscapular muscles.

2. **Indirect Facilitation:** Reduction in limb volume decreases pain, tissue tension, and the physical mass of the arm, thereby reducing mechanical resistance to movement.

- **Evidence Base:** Studies measuring outcomes post-CDT or structured exercise programs consistently report **significant improvements in shoulder flexion, abduction, and external rotation**, as well as in functional task performance. The improvement often correlates with the degree of volume reduction.

- **Importance of Early Integration:** Post-operative rehabilitation emphasizing early shoulder mobilization is crucial to prevent adhesive capsulitis, which can coexist with and complicate BCRL management.

5. Comparative and Practical Insights

- **Exercise is Foundational:** It is a safe and necessary component for both outcomes—aiding decongestion and being the primary tool for restoring mobility.

- **Technology-Adjuncts:** Intermittent pneumatic compression may offer additive volume reduction in refractory cases. Low-Level Laser Therapy shows promise in reducing fibrosis, potentially improving tissue pliability and ROM.

- **The Adherence Challenge:** Long-term maintenance of both reduced circumference and preserved mobility hinges on consistent use of compression garments (flat-knit) and adherence to a home exercise program. Education and self-management are critical.

6. Conclusion and Clinical Recommendations

Physiotherapy management for BCRL is dually effective. **For reducing limb circumference, compression therapy is the most critical element. For improving shoulder mobility, therapeutic exercise is the key.** An integrated CDT approach successfully addresses both by combining these modalities. Clinicians should:

1. Set combined goals for volume reduction *and* functional improvement from the outset.

2. Prioritize compression bandaging/garments and prescribe individualized, progressive exercise regimens.

3. Empower patients through education for effective long-term self-management.

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