



International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Scholarly Publisher
RS Global Sp. z O.O.
ISNI: 0000 0004 8495 2390

Dolna 17, Warsaw,
Poland 00-773
+48 226 0 227 03
editorial_office@rsglobal.pl

ARTICLE TITLE

MODERN PHYSIOTHERAPEUTIC MANAGEMENT IN WOMEN WITH
BREAST CANCER TREATED WITH BCT - A REVIEW ARTICLE

DOI

[https://doi.org/10.31435/ijitss.4\(48\).2025.4458](https://doi.org/10.31435/ijitss.4(48).2025.4458)

RECEIVED

29 September 2025

ACCEPTED

21 November 2025

PUBLISHED

25 November 2025

LICENSE



The article is licensed under a **Creative Commons Attribution 4.0 International License**.

© The author(s) 2025.

This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

MODERN PHYSIOTHERAPEUTIC MANAGEMENT IN WOMEN WITH BREAST CANCER TREATED WITH BCT - A REVIEW ARTICLE

Piotr Kaczmarek (Corresponding Author, Email: pkaczmarek099@gmail.com)

Collegium Medicum, Nicolaus Copernicus University, ul. Jagiellońska 13/15, 85-067 Bydgoszcz, Poland
ORCID ID: 0009-0003-5653-4570

ABSTRACT

Breast carcinoma maintains its status as the most frequently diagnosed malignancy among women globally, with epidemiological data demonstrating the registration of over 2.3 million new cases annually. This trend is characterized by a persistent and concerning increase in incidence rates across various demographic strata. Consequently, optimizing both oncological efficacy and the subsequent quality of life (QoL) has become a primary focus in clinical oncology.

Among the established therapeutic modalities for localized breast cancer, Breast-Conserving Therapy (BCT)—typically involving lumpectomy or partial mastectomy followed by adjuvant radiotherapy—has achieved substantive clinical ascendancy and is now frequently regarded as the standard of care for early-stage disease. This preference is driven by robust Level I evidence indicating oncological outcomes non-inferior to radical mastectomy, coupled with superior patient-reported outcomes (PROs) concerning body image and psychological well-being.

The widespread adoption of this conservative surgical paradigm has generated a corresponding and significant surge in the volume of patients who require comprehensive, evidence-based rehabilitation following their primary treatment course. Despite its minimally invasive nature relative to mastectomy, BCT is frequently associated with long-term functional sequelae. These morbidities can encompass a restricted range of motion (ROM) of the ipsilateral shoulder, the development of lymphedema, chronic neuropathic or myofascial pain syndromes, and generalized functional decline.

In this context, specialized physiotherapeutic intervention becomes an indispensable component of the continuum of care. The structured implementation of rehabilitation protocols aims to mitigate these potential complications, restore optimal biomechanical function, and ultimately, enhance the overall QoL and long-term functional status of the patient population. The aim of the current paper is to critically present and analyze the latest contemporary approaches and methodological advancements in the field of physiotherapy. This exploration focuses specifically on their application in improving the functional outcomes and addressing the complex physical morbidities encountered in patients who have undergone BCT.

KEYWORDS

Breast-Conserving Therapy, Breast Cancer, Physiotherapy, Lymphedema, Kinesiotherapy

CITATION

Piotr Kaczmarek. (2025) *Modern Physiotherapeutic Management in Women With Breast Cancer Treated With BCT – A Review Article*. International Journal of Innovative Technologies in Social Science. 3(47). doi: 10.31435/ijitss.3(47).2025.4458

COPYRIGHT

© The author(s) 2025. This article is published as open access under the **Creative Commons Attribution 4.0 International License (CC BY 4.0)**, allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

Introduction

The surgical paradigms for managing invasive breast cancer have undergone profound and radical transformations over the past few decades. The historical approach, which centered on maximal tumor resection via radical procedures (such as the radical mastectomy, e.g., per Halsted), often resulted in significant disfigurement and a high incidence of functional morbidities. This approach has been progressively replaced by a minimally invasive and oncoplastic ethos.

Contemporary techniques prioritize achieving comprehensive oncological control—specifically, obtaining negative surgical margins—while simultaneously maximizing the preservation of cosmetic outcome and the anatomical integrity of the breast. This crucial evolutionary shift has led to the widespread adoption of Breast Conserving Treatment (BCT), also variously referred to as segmental mastectomy, lumpectomy, or quadrantectomy followed by adjuvant radiotherapy.

BCT is now recognized as the gold standard of care for patients presenting with early-stage breast cancer (typically T1-T2, Stage I and II). Key evidence-based clinical trials (EBC, Level 1) have conclusively demonstrated that in terms of overall survival and disease-free survival, BCT combined with radiotherapy is non-inferior to mastectomy. Crucially, it provides significantly improved Quality of Life (QoL), body image satisfaction, and upper extremity function [1, 2]. Consequently, the utilization and prevalence of BCT have markedly increased, particularly within the subpopulation of women with lower disease staging and favorable prognostic factors.

Although BCT is less invasive than mastectomy, it is not devoid of potential sequelae. Postoperative complications, including restricted Range of Motion (ROM) in the shoulder joint, myofascial dysfunctions, chronic pain, and notably, the development of upper limb and trunk quadrant lymphedema, remain significant clinical challenges that impact patient QoL [3].

Therefore, comprehensive and individualized physiotherapy constitutes an integral and indispensable component of the modern post-BCT therapeutic protocol. The effective implementation of rehabilitation is critical for the minimization of postoperative complications, the restoration of full functional capacity, and the optimization of the patient's psychophysical recovery. [2,3]

This article aims to provide a detailed analysis and critical comparison of the available and currently recommended physiotherapeutic modalities (including manual lymphatic drainage, manual therapy, kinesiotherapy, compression bandaging, and patient education) employed in the holistic recovery process of women who have undergone surgical treatment for breast cancer using the BCT method. The overarching goal is to synthesize the current body of evidence and delineate the most effective interventional strategies based on robust scientific data.

Material and methods

This paper presents a comprehensive literature review encompassing the latest research and scientific reports concerning complex physiotherapy care for patients after BCT procedures. It incorporates modern therapeutic approaches and outlines possible future directions for the development of rehabilitation in patients following breast-conserving surgeries.

State of Knowledge

Recent findings indicate that the most effective therapeutic methods in the rehabilitation of women after BCT includes: prevention and treatment of lymphedema, kinesiotherapy, and pain-targeted therapy. All three of these elements address the most common complications following BCT procedures: lymphedema, impaired upper limb functional status, and chronic pain. Clinical studies and the latest reports demonstrate that therapy aimed at combating ailments arising as complications after surgery has proven high effectiveness and positively influences the faster improvement of the patient's health status post-operation.

Epidemiology

Breast cancer is the most prevalent malignancy among women globally. In Poland, it accounts for over 25% of all diagnosed female cancers and is responsible for nearly 13% of cancer-related deaths [3]. European statistics corroborate this trend, with breast cancer representing almost 29% of all cancer incidences and contributing to nearly 9% of cancer mortality. Notably, research from 2019 indicates a negative correlation between the accessibility and quality of healthcare and the incidence of breast cancer within European populations. This inverse relationship is exemplified by countries like Serbia and Montenegro, which report among the highest rates of breast cancer incidence in Europe [4,5].

In 2022 alone, over 2.3 million cases of breast cancer were reported worldwide. During the same year, global statistics indicated a concerning 670,000 deaths among women afflicted with this type of cancer. Recent studies reveal that the incidence of breast cancer is annually increasing by 1% to as much as 5% in nearly half of the countries surveyed. Concurrently, in 29 countries with a very high Human Development Index, breast cancer mortality is declining. The objective is to achieve an annual reduction in breast cancer mortality of 2.5%. It is estimated that by 2050, the number of new cases and associated deaths will increase by 38% and 68%, respectively, on a global scale. Countries with a low Human Development Index are projected to bear the brunt of this statistical increase [6].

Causes of breast cancer

Breast cancer most frequently affects women nearing their 70s, with the median age of incidence being 62 years. Diagnoses in women under 40 are uncommon, with a probability of less than 1%. The direct cause of breast cancer development is the uncontrolled proliferation of epithelial cells within the mammary gland. Numerous risk factors can influence the acceleration, onset, or reduction of the probability of such uncontrolled cell division [7]. Fundamentally, breast cancer risk factors can be categorized into modifiable and non-modifiable factors. We categorize the non-modifiable factors as follows:

- Age - The risk of breast cancer in women increases with advancing age.
- Genetic Factors - Genetic mutations, specifically in genes such as BRCA1, BRCA2, or HER2, significantly elevate the risk of breast cancer incidence. The presence of these gene mutations in close family members is also a factor that increases the likelihood of developing the disease.
- Reproductive History - Early menarche, late menopause, and a later age at first full-term pregnancy are associated with an increased risk.
- Previous Breast Conditions - A history of breast cancer, benign non-neoplastic changes in the mammary gland, or prior medical interventions (e.g., radiotherapy) increases the susceptibility to developing breast cancer [7, 8, 9].

Modifiable factors are those related to a patient's lifestyle, meaning they can be influenced directly or indirectly. The modifiable risk factors for breast cancer incidence include:

- Body Mass and Physical Activity - Overweight, obesity, and insufficient physical activity increase the risk of breast cancer in women, particularly during the postmenopausal period.
- Substance Use - Alcohol consumption and both passive and active smoking elevate the risk of developing cancerous disease.
- Breastfeeding - This is a factor that reduces the likelihood of breast cancer occurrence.
- Hormone Replacement Therapy (HRT) - Treatment administered during menopause to alleviate symptoms increases the risk of breast cancer [10, 11, 12].

Diagnostics

Early and properly conducted diagnostics are crucial for accurate diagnosis and prompt initiation of cancer treatment. For breast cancer, the following diagnostic methods are widely utilized:

- Breast Self-Examination (BSE) - This is the simplest examination method that all women over 20 years of age should perform. Monthly breast self-examination is recommended on the first day after menstruation. Despite its low diagnostic efficacy, not exceeding 15%, it is advised to increase patient self-awareness and to expedite proper diagnosis in case concerning changes are detected.
- Mammography (MMG) - This is the primary and most frequently used screening method, boasting a high diagnostic efficacy of up to 95%. It involves taking X-ray images of the mammary gland.
- Magnetic Resonance Imaging (MRI) - This diagnostic method offers high sensitivity for detecting changes and is used in women with an elevated risk of breast cancer, as well as for further diagnostic evaluation and assessment of disease stage after detection.
- Breast Ultrasonography (USG) - This method is employed as a supplement to MMG. As a standalone diagnostic method, it exhibits low efficacy, not exceeding 36%.
- Breast Biopsy - This involves obtaining a tissue or fluid sample for microscopic examination, which is essential for confirming or excluding the presence of cancerous disease. Several types of biopsies are used in different clinical scenarios and may be performed under the guidance of imaging studies, such as USG or MRI.
- Molecular Diagnostics - These are advanced tests involving the molecular analysis of the tumor, its stage of advancement, and the determination of treatment prognoses and patient survival based on this analysis. They are performed to evaluate receptors (e.g., HER2, estrogen, progesterone) and to analyze patient gene expression [13, 14, 15, 16].

Breast-Conserving Therapy (BCT) and Associated Elements

Breast-conserving therapy (BCT) is a surgical approach for breast cancer designed to preserve the breast. This method involves the excision of the tumor along with a margin of healthy tissue, while retaining the majority of the female mammary gland. Over the past two decades, numerous clinical studies have demonstrated that BCT is not only a safe and effective treatment method for breast cancer but also that the rates of locoregional recurrence following this type of surgical treatment are no greater than after a classic mastectomy. In both cases, recent research indicates an approximate 5-8% chance of local recurrence, most frequently associated with the most aggressive tumor types linked to HR and HER2 receptors. Consequently, the more invasive method of mastectomy is increasingly less often utilized as the primary recommended treatment, with the majority of patients in Stage I and II of the disease being candidates for breast-conserving treatment [17, 18].

Breast-conserving therapy involves the excision of the tumor along with a margin of healthy tissue (known as lumpectomy), followed by subsequent irradiation of the mammary gland to eliminate any potentially remaining cancer cells. This comprehensive approach aims to maximize treatment efficacy while achieving a satisfactory cosmetic outcome. As previously indicated, this treatment is typically reserved for women with early-stage tumors and those with small tumor sizes.

Contraindications for BCT include:

- Diffuse cancerous lesions
- Inability to achieve a satisfactory cosmetic outcome
- High stage of cancerous disease
- Contraindications to postoperative radiotherapy
- Presence of active multi-organ diseases such as systemic sclerosis
- Extensive microcalcifications currently present in the mammary gland
- Pregnancy [17, 19, 20]

Complications Following Breast Cancer Treatment with BCT

Despite its effectiveness and generally limited invasiveness, Breast-Conserving Therapy (BCT), like any surgical intervention, can lead to certain complications in both the immediate and long-term postoperative periods. The most significant and frequent complications include:

- Lymphedema - One of the most common and potentially debilitating complications of treatment. It is most frequently associated with the removal of lymph nodes during surgery and can also arise as a complication of radiotherapy. Extensive surgical interventions in the axillary region are indicated to increase the probability of lymphedema occurrence by up to 48% [21, 22].

- Restricted Range of Motion in the Shoulder Joint - Common complication of oncological treatment in breast cancer patients. The most frequent causes of limited shoulder joint mobility include postoperative scarring, weakened strength and endurance of shoulder girdle muscles, tissue fibrosis as a complication of radiotherapy, and pain [23, 24].

- Pain - Pain is a commonly occurring side effect of treatment, particularly in the early postoperative phase. It is most often the result of localized tissue damage from the surgical procedure and resolves after wound healing. However, it can also stem from nerve compression, radiotherapy, or inflammation. In such cases, it is chronic pain that requires treatment.

- Muscle Weakness - This complication results from both the surgical procedure and subsequent adjuvant treatments like radiotherapy [25, 26].

- Poorly Healed Postoperative Scars - A scar after surgery can be hard, taut, and restrict range of motion. In such instances, it is crucial to implement treatment aimed at improving elasticity and reducing the pain caused by the scar [27].

Physiotherapeutic Management in Women After Breast Cancer Treatment with BCT

Physiotherapy, as an evidence-based intervention, constitutes a critical factor and an integral component of the multidisciplinary care protocol during the recovery process for patients post-surgical management of breast cancer. Its relevance is particularly accentuated within the context of Breast Conserving Treatment (BCT). The early initiation and methodical implementation of a comprehensive rehabilitation program in the postoperative period enable a significant reduction in the incidence, severity, and long-term manifestation of complications associated with both the surgical intervention itself and the frequently accompanying adjuvant radiotherapy.

Contemporary oncological physiotherapy shifts from empirical protocols toward an approach strictly grounded in Evidence-Based Practice (EBP) and the analysis of the latest scientific data. This mandates the continuous evaluation of the efficacy of therapeutic procedures and their comprehensive, individualized application to adequately address the complex and multifactorial health issues that develop as sequelae of the anti-neoplastic treatment.

Current clinical trends and expert consensus regarding physiotherapeutic management post-BCT procedures necessitate a focus on the following, mutually complementary directions for patient support:

Prevention and Treatment of Lymphedema

The prevention and effective management of the clinical manifestation of lymphedema in the upper extremity and torso quadrant represent one of the key therapeutic challenges confronting physical therapy specialists involved in the rehabilitation of complications following Breast Conserving Treatment (BCT). The contemporary clinical approach places a strong emphasis on early risk stratification (assessment of predictive factors) and intensive patient education concerning long-term prophylactic strategies and self-management techniques.

In cases where lymphedema is documented to have developed, the gold standard intervention remains Complete Decongestive Therapy (CDT). This is a multimodal and biphasic therapeutic protocol whose intensive phase comprises four integral and complementary components:

1. Manual Lymphatic Drainage (MLD): The application of specific, superficial drainage techniques aimed at improving lymph transport by stimulating lymphangiomotor activity and redirecting lymphatic fluid from congested areas to functionally competent lymph nodes and collectors.
2. Compression Therapy: The utilization of compression systems, such as short-stretch compression bandages in the initial phase and custom-fitted compression garments in the maintenance phase. The mechanical effect of compression is critical for inhibiting ultrafiltration of fluids from capillaries into the interstitial space and for the reduction of edema volume.
3. Decongestive Kinesiotherapy: Specially designed muscle exercises, performed while wearing compression, that activate the so-called muscle pump, thereby supporting lymphatic and venous circulation.
4. Skin Care and Hygiene: An essential component for maintaining the integrity of the skin barrier, minimizing the risk of infections (e.g., cellulitis/erysipelas), and preventing skin damage that could lead to exacerbated inflammation and intensified lymphedema.

Analysis of the scientific literature provides varied data regarding the efficacy of CDT. Some interventional studies suggest that the methodical application of the CDT protocol can lead to a significant reduction in the volume of established lymphedema, reaching a rate of nearly 48% under optimal clinical conditions.

However, controlled comparative studies (RCTs) are also emerging that contrast the full CDT protocol with classical compression monotherapy (utilizing only compression garments and bandaging). These reports suggest that both therapeutic strategies may exhibit a comparable level of efficacy, ranging in edema reduction between 22% and 30%. In the context of health economics and resource availability, compression therapy—as an intervention that requires significantly less staff involvement and reduced logistical overhead—could potentially become the preferred, first-line method for anti-edema intervention in the future.

Nevertheless, until additional, high-methodology, multi-center clinical trials are conducted that conclusively confirm the equivalence or superiority of simplified protocols over the gold standard, Complete Decongestive Therapy (CDT) remains the standard operating procedure for the treatment of secondary lymphedema resulting from breast cancer treatment [21, 28].

Restoring full range of motion and upper extremity function

Current methodologies emphasize the benefits of initiating rehabilitation even before the surgical procedure itself. These interventions, known as prehabilitation, are a crucial component of the modern approach to oncological patients. Recent studies indicate that patients participating in a prehabilitation program reported no or only minor difficulties in performing tasks of high and medium difficulty in daily life nearly 90% of the time one year post-surgery. Furthermore, most prehabilitation participants showed no impairments in shoulder joint range of motion at all follow-up visits, except for the first one month after the procedure. These statistics underscore the importance of prehabilitation in patient recovery and the need to establish it as a standard in oncological care [29, 30].

Contemporary physiotherapy has begun to move away from standardized exercise plans for patients in favor of individually tailored programs that consider patients' specific needs, capabilities, and overall health status. Modern exercise programs designed by physiotherapists often combine the following types of exercises:

- Strengthening Exercises - Focused on improving muscle strength and endurance, including resistance and endurance training.
- Range of Motion (ROM) Restoration Exercises - Starting with small movements, the range of motion in joints are gradually expanded, ultimately aiming to restore full functional mobility in the affected joint.
- Functional Exercises - A type of training that mimics daily activities performed by patients, designed to adapt them to everyday functioning.

Recent research indicates that the application of the aforementioned combination yields significant improvement in all joint movements, reaching up to 95%. This suggests a positive patient response to the proposed kinesiotherapeutic treatment approach [30, 31].

Pain Management

The foundational pillar of the contemporary physiotherapeutic protocol in the context of oncological pain sequelae is the precise etiological identification of the pain source. The accurate determination of the pathophysiological mechanism and the structural origin of the pain is the sine qua non condition for developing and implementing targeted, highly specific therapeutic interventions.

Among the scientifically validated and most frequently employed methods in oncological physiotherapy aimed at pain reduction, the following modalities are distinguished:

Manual therapy finds broad application in modulating pain elicited by somatic dysfunction. These techniques are particularly effective in treating tissue restrictions (increased myofascial tension), managing post-operative scars (minimizing adhesions and fibrosis), deactivating myofascial trigger points (TrPs), and correcting articular dysfunctions of the upper extremity and shoulder complex. The latest Randomized Controlled Trials (RCTs) consistently affirm the clinical benefits derived from incorporating manual therapy as a therapeutic component, which significantly impacts the reduction of subjective pain perception and improves functional parameters [32].

Kinesiotherapy, based on active therapeutic movement, plays a crucial role in long-term pain management. Systematic and methodical exercises focused on increasing muscle strength and endurance, as well as improving joint Ranges of Motion (ROM) (especially in the glenohumeral joint), contribute to the normalization of biomechanical loads within the shoulder-cervical complex. This biomechanical optimization directly influences the reduction of stress on neural and musculoskeletal structures, and consequently, the mitigation of chronic pain syndromes [30, 31].

A significant sub-group of patients, particularly those who have undergone radiotherapy and/or chemotherapy, may experience neuropathic pain syndromes secondary to nerve fiber damage. Epidemiological analyses indicate that nearly 67% of breast cancer patients may report pain complaints of a neuropathic etiology (e.g., post-mastectomy pain syndrome, chemotherapy-induced neuropathy).

Physiotherapeutic interventions targeted at neuropathic pain include:

- Neurodynamic Techniques: Gentle mobilizations of peripheral nerves designed to improve their gliding capacity and vascular supply.
- Light Structural Mobilizations: Employed to decrease mechanical compression on irritated structures.
- Therapeutic Education: Crucial for understanding the pain mechanisms and mastering coping strategies for daily functioning.

The application of Transcutaneous Electrical Nerve Stimulation (TENS) in pain therapy for oncology patients is currently burdened with considerable methodological controversy. It necessitates the conduct of further high-quality scientific research that will conclusively confirm not only the beneficial analgesic effects but, fundamentally, the lack of clinical risk for patients with active or history of neoplastic disease [33].

Education

A crucial element in the modern physiotherapist's work with patients after BCT procedures is to conduct an appropriate educational process. A proper approach to patient education is key for her to adequately understand and prepare for the challenges that will arise from the surgical treatment of cancer. Studies indicate that well-informed patients are significantly better equipped to cope with complications than those who did not receive such preparation [34].

It is crucial to promote self-initiated physical activity and make patients aware of how much they can do for themselves in the rehabilitation process, in managing pain, and in addressing limitations resulting from surgical treatment. Maintaining long-term patient engagement in the rehabilitation process is essential for her to derive benefits from this process. Consequently, the physiotherapist should not only provide a set of exercises with explanations but, most importantly, tailor the exercises to the patient's needs and the challenges she faces in daily life [35, 36].

Patient education also aims to equip her with knowledge useful for self-management of postoperative complications. This particularly applies to the prevention and management methods for lymphedema. Studies confirm that patients in the rehabilitation process who received education on preventing lymphedema are better able to manage it and generally achieve better treatment outcomes than other study groups. Patients should be trained in, among other things: self-massage, correct compression therapy, skin care principles, and the application of appropriate modifications in daily functioning to avoid lymphedema. Research indicates that the proper combination of physiotherapy with appropriate patient education reduces the risk of complications by as much as 65% [37].

Discussion

This paper undertakes the task of systematic presentation and critical comparison of the most current and clinically relevant physiotherapeutic methodologies applied in the process of functional rehabilitation for patients post-surgical interventions of the Breast Conserving Treatment (BCT) type. The specialized literature and latest scientific evidence based on Evidence-Based Medicine (EBM) unequivocally indicate that an effective, comprehensive rehabilitation program after breast-conserving surgery must constitute a holistic sequence of interventions, encompassing a range of mandatory therapeutic components.

In accordance with current guidelines and expert consensus, the core components of this program include:

1. **Strategies for the Prevention and Management of Lymphedema:** This is a critical element that involves early prophylactic intervention and, in cases of clinical manifestation, the application of Complete Decongestive Therapy (CDT). This encompasses manual lymphatic drainage, skin care, remedial exercises, and compression therapy (bandaging and/or compression garments).

2. **Individually Defined Kinesiotherapy Program:** Exercises must be strictly tailored to the patient's individual functional status, her range of motion (ROM) in the shoulder joint, muscle strength, and any pain-related limitations. Kinesiotherapy is essential for the prevention of scar adhesions and the restoration of full Range of Motion (ROM) in the ipsilateral upper extremity.

3. **Pain Management and Prevention of Pain Syndromes:** This involves interventions aimed at reducing neuropathic and myofascial pain syndromes associated with the surgery and subsequent radiotherapy.

4. **Therapeutic Education (Self-Management Education):** A crucial element that provides the patient with knowledge about self-care, correct posture, work ergonomics, self-monitoring for lymphedema, and the necessity of regular physical activity.

The synergistic combination and methodical implementation of all aforementioned therapeutic factors yield measurable clinical benefits and translate into a significant improvement in the patients' psychophysical condition as well as their biopsychosocial functioning following oncological treatment.

A vigorous debate persists within the scientific and clinical community regarding the potential for substitution or modification of certain components within the current therapeutic status quo. For instance, questions are being raised about the optimal intensity and duration of the intensive phase of CDT, and the significance of specific components of compression therapy across different stages of lymphedema.

However, any potential alteration to the therapeutic "gold standards," such as CDT protocols and standard compression therapy, necessitates rigorous, in-depth clinical trials (RCTs) with high statistical power. In the context of current knowledge, any radical change appears unlikely in the near future, considering the conclusively scientifically proven effectiveness and safety of the comprehensive and interdisciplinary physiotherapeutic methods currently in use.

Conclusions

Based on the latest scientific reports and specialized clinical analyses, the establishment of a comprehensive rehabilitation program in the postoperative period following Breast-Conserving Surgery (BCS) constitutes an absolute prerequisite for optimizing treatment outcomes.

This program must obligatorily incorporate multidisciplinary intervention elements that are closely integrated and individually tailored to each patient's clinical profile:

1. Prophylaxis and Therapy for Lymphedema
2. Individually Designed Kinesiotherapy Protocol
3. Pain Management
4. Structured Patient Education

The synergistic combination of the aforementioned therapeutic factors generate measurable clinical benefits. The result of this integrated strategy is a statistically significant improvement in the health status and Quality of Life (QoL) indicators of the patients. This improvement is observed across all domains of functioning, including physical, psychological, and social aspects following the surgical procedure.

Funding Statement: This research did not receive special funding.

Conflict of Interest Statement: The author declared no potential conflict of interest with respect to the research, authorship and/or publication of this article.

REFERENCES

1. Litière, S., Werutsky, G., Fentiman, I. S., Rutgers, E., Christiaens, M. R., Van Limbergen, E., Baaijens, M. H., Bogaerts, J., & Bartelink, H. (2012). Breast conserving therapy versus mastectomy for stage I–II breast cancer: 20-year follow-up of the EORTC 10801 phase 3 randomised trial. *Lancet Oncology*, 13(4), 412–419. [https://doi.org/10.1016/S1470-2045\(12\)70042-6](https://doi.org/10.1016/S1470-2045(12)70042-6)
2. Agarwal, S., Pappas, L., Neumayer, L., Kokeny, K., & Agarwal, J. (2014). Effect of breast conservation therapy vs mastectomy on disease-specific survival for early-stage breast cancer. *JAMA Surgery*, 149(3), 267–274. <https://doi.org/10.1001/jamasurg.2013.3049>
3. Didkowska, J., & Wojciechowska, U. (2013). Nowotwory piersi w Polsce i Europie — populacyjny punkt widzenia. *Nowotwory Journal of Oncology*, 63, 111–118.
4. Aljohar, B. A., & Kilani, M. A. (2018). Breast cancer in Europe: Epidemiology, risk factors, policies and strategies—A literature review. *Global Journal of Health Science*, 10(11), 1. <https://doi.org/10.5539/gjhs.v10n11p1>
5. Yu, S., Cai, X., Wang, X., Lin, X., & Cai, S. (2024). Disease burden of breast cancer and risk factors in Europe 44 countries, 1990–2019: Findings of the Global Burden of Disease Study 2019. *Frontiers in Endocrinology*, 15, 1405204. <https://doi.org/10.3389/fendo.2024.1405204>
6. Kim, J., Harper, A., McCormack, V., Sung, H., Houssami, N., Morgan, E., Mutebi, M., Garvey, G., Soerjomataram, I., & Fidler-Benaoudia, M. M. (2025). Global patterns and trends in breast cancer incidence and mortality across 185 countries. *Nature Medicine*, 31(4), 1154–1162. <https://doi.org/10.1038/s41591-025-03502-3>
7. Kaleta, P., Rzepka, Z., Janus, M., & Wrześniok, D. (2023). Rak piersi: epidemiologia, klasyfikacja molekularna, postępowanie diagnostyczno-terapeutyczne. *Biologia Nowotworów, Farmacja Polska*, 79(11), 689–698.
8. McPherson, K., Steel, C. M., & Dixon, J. M. (2000). Breast cancer—Epidemiology, risk factors, and genetics. *BMJ*, 321, 624–628. <https://doi.org/10.1136/bmj.309.6960.1003>
9. Centers for Disease Control and Prevention. (n.d.). *Breast cancer: Risk factors*. U.S. Government.
10. Vegunta, S., Lester, S., Pruthi, S., & Mussallem, D. (2020). Effects of major lifestyle factors on breast cancer risk: Impact of weight, nutrition, physical activity, alcohol, and tobacco. *Breast Cancer Management*, 9, BMT51. <https://doi.org/10.2217/bmt-2020-0033>
11. Łukasiewicz, S., Czeczulewski, M., Forma, A., Baj, J., Sitarz, R., & Stanisławek, A. (2021). Breast cancer—Epidemiology, risk factors, classification, prognostic markers, and current treatment strategies: An updated review. *Cancers*, 13(17), 4287. <https://doi.org/10.3390/cancers13174287>
12. Liu, H., Shi, S., Gao, J., Guo, J., Li, M., & Wang, L. (2022). Analysis of risk factors associated with breast cancer in women: A systematic review and meta-analysis. *Translational Cancer Research*, 11(5), 1344–1353. <https://doi.org/10.21037/tcr-22-193>
13. Iranmakani, S., Mortezaazadeh, T., Sajadian, F., Fazel-Ghaziyani, M., Ghafari, A., Khezerloo, D., & Ahmed, B. K. (2020). A review of various modalities in breast imaging: Technical aspects and clinical outcomes. *Egyptian Journal of Radiology and Nuclear Medicine*, 51. <https://doi.org/10.1186/s43055-020-00175-5>
14. Planche, K., & Vinnicombe, S. (2004). Breast imaging in the new era. *Cancer Imaging*, 4(2), 39–50. <https://doi.org/10.1102/1470-7330.2003.0033>
15. Silva, E., Meschter, S., & Tan, M. P. (2023). Breast biopsy techniques in a global setting: Clinical practice review. *Translational Breast Cancer Research*, 4, 14. <https://doi.org/10.21037/tbcr-23-12>
16. Varga, Z., & Maccio, U. (2024). Molecular pathology in breast disease: Diagnostic, prognostic, and therapeutic tools. *Virchows Archiv*, 484(2), 247–261. <https://doi.org/10.1007/s00428-023-03709-0>

17. Moo, T. A., Sanford, R., Dang, C., & Morrow, M. (2018). Overview of breast cancer therapy. *PET Clinics*, 13(3), 339–354. <https://doi.org/10.1016/j.cpet.2018.02.006>
18. Mendenhall, N. P. (2001). Breast-conserving therapy for early-stage breast cancer. *Hematology/Oncology Clinics of North America*, 15(2), 219–242. [https://doi.org/10.1016/s0889-8588\(05\)70209-4](https://doi.org/10.1016/s0889-8588(05)70209-4)
19. Omranipour, R. (2020). Surgery for pregnancy-associated breast cancer. *Advances in Experimental Medicine and Biology*, 1252, 95–99. https://doi.org/10.1007/978-3-030-41596-9_12
20. Fajdic, J., Djurovic, D., Gotovac, N., & Hrgovic, Z. (2013). Criteria and procedures for breast conserving surgery. *Acta Informatica Medica*, 21(1), 16–19. <https://doi.org/10.5455/AIM.2013.21.16-19>
21. Tambour, M., Tange, B., Christensen, R., & Gram, B. (2014). Effect of physical therapy on breast cancer-related lymphedema: Protocol for a multicenter, randomized, single-blind equivalence trial. *BMC Cancer*, 14, 239. <https://doi.org/10.1186/1471-2407-14-239>
22. Rönkä, R. H., Pamilo, M. S., von Smitten, K. A., & Leidenius, M. H. (2004). Breast lymphedema after breast conserving treatment. *Acta Oncologica*, 43(6), 551–557. <https://doi.org/10.1080/02841860410014867>
23. Giacalone, A., Alessandria, P., & Ruberti, E. (2019). The physiotherapy intervention for shoulder pain in patients treated for breast cancer: Systematic review. *Cureus*, 11(12), e6416. <https://doi.org/10.7759/cureus.6416>
24. Springer, B. A., Levy, E., McGarvey, C., Pfalzer, L. A., Stout, N. L., Gerber, L. H., Soballe, P. W., & Danoff, J. (2010). Pre-operative assessment enables early diagnosis and recovery of shoulder function in patients with breast cancer. *Breast Cancer Research and Treatment*, 120(1), 135–147. <https://doi.org/10.1007/s10549-009-0710-9>
25. Fernández-Lao, C., Cantarero-Villanueva, I., Fernández-de-Las-Peñas, C., del-Moral-Ávila, R., Castro-Sánchez, A. M., & Arroyo-Morales, M. (2012). Effectiveness of a multidimensional physical therapy program on pain, pressure hypersensitivity, and trigger points in breast cancer survivors: A randomized controlled trial. *Clinical Journal of Pain*, 28(2), 113–121. <https://doi.org/10.1097/AJP.0b013e318225dc02>
26. De Groot, J. E., Broeders, M. J., Branderhorst, W., den Heeten, G. J., & Grimbergen, C. A. (2014). Mammographic compression after breast-conserving therapy: Controlling pressure instead of force. *Medical Physics*, 41(2), 023501. <https://doi.org/10.1118/1.4862512>
27. Frassica, D. A., Bajaj, G. K., & Tsangaris, T. N. (2003). Treatment of complications after breast-conservation therapy. *Oncology*, 17(8), 1118–1131.
28. Donahue, P. M. C., MacKenzie, A., Filipovic, A., & Koelmeyer, L. (2023). Advances in the prevention and treatment of breast cancer-related lymphedema. *Breast Cancer Research and Treatment*, 200(1), 1–14. <https://doi.org/10.1007/s10549-023-06947-7>
29. Springer, B. A., Levy, E., McGarvey, C., Pfalzer, L. A., Stout, N. L., Gerber, L. H., Soballe, P. W., & Danoff, J. (2010). Pre-operative assessment enables early diagnosis and recovery of shoulder function in patients with breast cancer. *Breast Cancer Research and Treatment*, 120(1), 135–147. <https://doi.org/10.1007/s10549-009-0710-9>
30. Alicia, D. R. J., Manuel, G. S., & Ignacio, C. V. A. (2025). Physical prehabilitation in patients with breast cancer: A systematic review. *Supportive Care in Cancer*, 33(1), 71. <https://doi.org/10.1007/s00520-024-09122-w>
31. Xu, Q., Liu, C., Jia, S., Wang, P., Liu, Q., Ding, F., Ren, Y., Ma, X., & Zhu, J. (2024). Effect of physical exercise on postoperative shoulder mobility and upper limb function in patients with breast cancer: A systematic review and meta-analysis. *Gland Surgery*, 13(8), 1494–1510. <https://doi.org/10.21037/gs-24-255>
32. Min, J., Kim, J. Y., Ryu, J., Park, S., Courneya, K. S., Ligibel, J., Kim, S. I., & Jeon, J. Y. (2024). Early implementation of exercise to facilitate recovery after breast cancer surgery: A randomized clinical trial. *JAMA Surgery*, 159(8), 872–880. <https://doi.org/10.1001/jamasurg.2024.1633>
33. De Baets, L., De Groef, A., Hagen, M., Neven, P., Dams, L., Geraerts, I., Asnong, A., De Vrieze, T., Vets, N., Emmerzaal, J., & Devoogdt, N. (2023). The effect of myofascial and physical therapy on trunk, shoulder, and elbow movement patterns after breast cancer surgery. *PM&R*, 15(11), 1382–1391. <https://doi.org/10.1002/pmrj.12975>
34. Serra-Añó, P., Inglés, M., Bou-Catalá, C., Iraola-Lliso, A., & Espí-López, G. V. (2019). Effectiveness of myofascial release after breast cancer surgery in women undergoing conservative surgery and radiotherapy: A randomized controlled trial. *Supportive Care in Cancer*, 27(7), 2633–2641. <https://doi.org/10.1007/s00520-018-4544-z>
35. McGarragle, K. M., Zheng, S., Gagliese, L., Howell, D., Edwards, E., Pritlove, C., McCready, D., Elser, C., Jones, J. M., & Gauthier, L. R. (2025). Pain self-management behaviors in breast cancer survivors six months post-primary treatment: A mixed-methods descriptive study. *Cancers*, 17(7), 1087. <https://doi.org/10.3390/cancers17071087>
36. Jordan, R. M., & Oxenberg, J. (2025). Breast cancer conservation therapy. In *StatPearls*. StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK547708/>
37. Faravel, K., Jarlier, M., Meignant, L., Thomaso, M., Del Rio, M., Jacot, W., & Stoebner, A. (2024). Efficacy of a physiotherapy, yoga and patient education programme for patients with breast cancer and hormone therapy-induced pain: A multicentre randomised study protocol (SKYPE 2). *BMJ Open*, 14(1), e075378. <https://doi.org/10.1136/bmjopen-2023-075378>
38. Zhou, Y., Lu, Q., & Yu, X. (2025). Knowledge, attitude, and practice towards rehabilitation in patients with breast cancer: A cross-sectional study. *Journal of Multidisciplinary Healthcare*, 18, 1483–1492. <https://doi.org/10.2147/JMDH.S486270>
39. Lu, S. R., Hong, R. B., Chou, W., & Hsiao, P. C. (2015). Role of physiotherapy and patient education in lymphedema control following breast cancer surgery. *Therapeutics and Clinical Risk Management*, 11, 319–327. <https://doi.org/10.2147/TCRM.S77669>