

Physical Therapy A Critical Component in Breast Cancer and Secondary Lymphedema: A Rehabilitation Perspective

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Abstract—

Purpose: *The main purpose of the methodical review is to obtain the importance of Physiotherapy Rehabilitation in breast cancer-related lymphedema in order to elucidate the role of Physiotherapy in these patients.*

Methods: *A systematic data search was performed using Google scholar, PubMed (from February 2001 till August 2020) and is focused on the rehabilitative aspect of breast cancer related secondary lymphedema and undertaken according to the PRISMA statement with Levels of Evidence (LoE) assessed.*

Results: *14 randomized controlled trials that included 158 women with breast cancer in after care were included. The included for articles studies of effect different types of physiotherapy regimens like exercises that consisted of lymph training, swimming, resistance exercise, gravity-resistive exercise and aerobic exercises. The mentioned articles were thoroughly analyzed and included in the review.*

Conclusion: *The evidence indicates that Physiotherapy can improve subjective and objective parameters in BCRL patients although it is found to be helpful in improving the quality of life of these patients.*

Keywords— *Breast cancer, Lymphedema, Physiotherapy, Rehabilitation.*

I. INTRODUCTION

As per the recent data breast cancer is most common cancer in women worldwide. There is been satisfactory improvements in early detection, diagnosis, treatment and reduction of complications, side effects which includes fatigue, weakness, loss of muscle extensibility, limited shoulder range of motion, upper-body pain, pulmonary complications, neuropathy, decreases in lean mass and concomitant increases in fat mass,. The BCRL arises as a result of fluid accumulation in the interstitial tissue due to damage of the lymphatic system, induced by surgery and/or radiation, or tumor-induced neo-lymph angiogenesis. Maximum proportion of women undergoing axillary intervention develops swelling upto 2 years. Chances of breast cancer related lymphedema is further increased by some risk factors like extensive surgery, obesity, axillary lymph node procedure, and radiotherapy to the regional lymph nodes. Patients with BCRL typically suffer from a swollen upper limb, with concomitant feelings of weakness, heaviness, discomfort, and pain. Furthermore, there is an increased risk of infection and a chronic, progressive course of disease, leading to psychosocial distress and impaired quality of life (QoL). Treatment of BCRL typically consists of a multimodal therapy approach, including complex decongestive medicine, physiotherapy, and skin care. Although previous studies have indicated numerous positive benefits of exercise in breast cancer treatment such as improvements in physical performance, body composition, and quality of life along with an acute and chronic reduction in fatigue. The lack of recommendation to exercise rehabilitation along with the symptoms of breast cancer related

lymphedema often leads to insecurity of patients and physical activity avoidance. The vicious cycle resulted in which sedentary subjects leading to increase in body mass and to an undesired progression of the disease because overweight and obesity risk factors for the development of lymphedema. Therefore, the American Cancer Society recommends that primary care clinicians should counsel survivors on how to prevent or reduce the risk of BCRL, including weight loss for obese and overweight and to adopt an individual tailored exercise program. A number of studies have been published that have investigated the effect of exercise on BCRL and, as a result, the effects of resistance exercise on BCRL have already been extensively reviewed. However, to the best of our knowledge, previous reviews have not concluded the effect of physiotherapy on BCRL and hence there is a need to know whether the physiotherapy rehabilitation is found to have some positive effects on BCRL or not.

II. MATERIAL AND METHODS:

A systematic PubMed search was conducted in January 2019, and studies were considered from February 2001. Key words searched included ‘breast cancer-related lymphedema or lymphedemas effects of physiotherapy on Breast cancer related lymphedema. Other terms used were ‘physical activity’, ‘physical exercise’, ‘breast cancer’, ‘prevention’, ‘physical fitness’, ‘exercise program’, strength training sports therapy and endurance exercises, resistance training ‘exercise intervention’. Women suffering from BCRL had to be involved in an interventional physical activity. The intervention had to involve a form of physical activity for women who are already suffering from BCRL. Studies that had a preventive approach or that included both women with BCRL and women those were at risk for BCRL were excluded from the study.

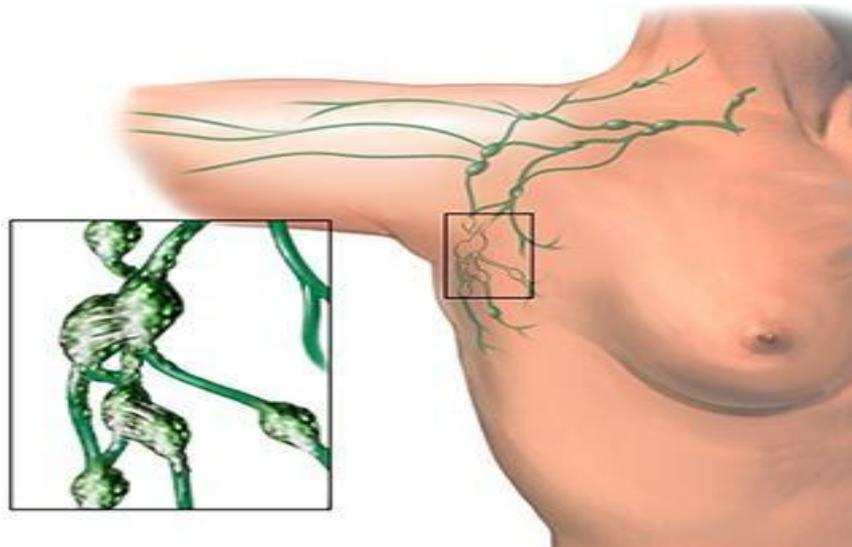


FIGURE 1

TABLE 1

INVOLVED CRITERIA IN THE STUDY

Inclusion criteria	Exclusion criteria
Breast cancer diagnosis	Preventive therapy or mixed approach Diagnosis
BCRL diagnosis	Studies published before 2000

2.1 Randomised controlled studies Women

This review focused on outcome measures that presented the role and importance of physiotherapy on Lymphedema and it focuses on the cases of BCRL. The review was aligned to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) process.

2.2 Evidence criteria levels

I: Meta-analyses of RCTs

IA: RCT of breast cancer survivors

IB: RCT based on cancer survivors across

2.3 Multiple cancer sites

IC: RCT based on general population experiencing a specific longterm or late effect (e.g., managing menopausal symptoms, sexual dysfunction, etc.)

IIA: Non-RCTs based on breast cancer survivors

IIB: Non-RCTs based on cancer survivors across multiple sites

IIC: Non-RCTs for general population experiencing a specific long-term or late effect

III: Case-control study or prospective cohort Study

0: Expert opinion

III. RESULTS:

Number of 38 studies were identified and filtered by “clinical trial,” and “female.” Following this, 25 studies were excluded and 14 were selected for abstract- or full-text-analysis. From these, 14 articles included in this review that comprised a total number of 158 patients. The studies were published between 2001 and 2020 and the study sample sizes ranged from 14 to 151 patients. All women included in the trials had been diagnosed with Breast Cancer Related Lymphedema at study entry and had completed the primary therapy for breast cancer. The average age of the women was 55 years, and the intervention period ranged from 6 weeks up to 1 year. The number of training sessions varied between one and seven sessions per week. All interventions were at least initially supervised. Measurements in all trials were undertaken at baseline and at different times during and after the interventions. Arm volume and arm circumference were assessed used in the studies: limb circumference measurements were undertaken in 6 studies. All included studies had a controlled randomized study design and included women with pre-existing BCRL. Of the 14 studies, only 2 had both the participants and assessors blinded and two studies did not mention any blinding. The summary of the included articles are as follows:

- Schmitz et al. 2010 (20) - RCT - To assess the upper limb girth after rehabilitation in BCRL cases -physiotherapy was found to be effective.
- Robyn C. Box et al. 2002 (15)- RCT - To determine the effects of physiotherapy on post surgery breast cancer Lymphedema -A significant reduction in development of secondary Lymphedema has been concluded.

- Marianne Eurertz et al. 2011 (16) – RCT - To conclude the effect of physiotherapy on Lymphedema as secondary complication of Breast cancer surgery Positive effects of physiotherapy on Lymphedema was concluded.
- Nela Devoogt et al. 2018 (17) - RCT - Effect of physiotherapy on Upper limb volume on post cancer breast surgery Reduction in the girth of the affected limb was concluded.
- Bolette S Rafn et al 2018 (18) Pilot- RCT - Effect of physiotherapy on Lymphedema on Quality of life of the patient Improvement in the Quality of life of the patients.
- Freek T. Baumann et al. 2018 (19) – RCT- Effect of physiotherapy intervention on Upper limb weight on post cancer breast cancer surgery patients. Reduction in the weight of the limb was found.
- Sing B, Buchan, Box R, et al. 2016(3)-RCT-compression use during exercise intervention to determine the effects of physiotherapy in breast cancer – related lymphedema.
- Torres Lacomba et al. 2010 (21) - RCT- Pre and post Surgery effects of physiotherapy on BCRL It limits the lymphedema and hence give positive results.
- Zimmermann et al. 2012 (22) - RCT - Effect of physiotherapy on Upper limb volume on post Cancer breast surgery It reduces the volume and hence found to be beneficial.
- Devoogdt et al. 2011 - RCT - Effect of physiotherapy intervention on Upper limb weight on post cancer breast cancer surgery patients It reduces the upper limb girth.
- Zhang et al. 2016(15) - RCT - Effect of physiotherapy intervention on Upper limb weight on post cancer breast cancer surgery patients It has positive effects post intervention.
- Sinead Cobbe et al. 2017 - RCT - Complex decongestive therapy as a regimen as a part of physiotherapy rehabilitation for lymphedema patients CDT therapy was found to be effective on Lymphedema.
- Maria Torres Lacomba et al.2010 - RCT - Early physiotherapy treatment for pre and post of BCRL Patients Physiotherapy was found to be effective.
- Donald C. McKenzie 2014 - RCT - Effect of progressive upper limb exercise program Progressive upper limb exercise was found to be effective.

IV. DISCUSSION

The intervention had to involve a form of physical activity for women who are already suffering from BCRL. Studies that had a preventive approach or that included both women with BCRL and women those were at risk for BCRL were excluded from the study.

To the best of knowledge, this is the first methodical review that has considered the effects of different types of physical exercise as a part of physiotherapy rehabilitation on women suffering from BCRL. Within the 14 included studies, we found all the included studies conclude the positive effect of physiotherapy regimens on BCRL patients. The findings of the present systematic review demonstrate that physical exercise improves BCRL state. To the best of our knowledge, this systematic review is the first to summarize the effects of different types of physical exercises on BCRL and was produced according to the guidelines of PRISMA. We believe this paper provides excellent grounds for

supporting guidelines on the role of exercise in women with BCRL. As the studies summarized in this review were published from 2001 to 2020, the findings are both recent and timely. Nevertheless, when interpreting the present findings one should consider possible limitations. The present study only concludes the conclusion part of the included studies. The study did not critic or discuss the regimens independently. A number of studies might be possible by adding different regimens or interventions for pre or post breast cancer surgery patients. Moreover, as a result of the low number of studies available, no standard definition for BCRL was used and the measurement techniques differed among the studies. However, while this must certainly be considered as a limitation of the present review, it should be noted that there is a lack of definition for BCRL even in medical care, making the investigation of treatment methods challenging. Based on the present findings, it can be concluded from the current literature that physical exercise is not contraindicated for women with BCRL. When completed according to the ACSM guidelines for cancer survivors there is no restriction recommended regarding BCRL and any form of exercise. As such, our findings are in contrast to the early recommendations by health care professionals to avoid vigorous or excessive upper-body exercise, including activities of daily living. Moreover, future studies may also focus on the possible preventive aspects of physical exercise for the development of BCRL in breast cancer patients.

REFERENCES

- [1] Baumann FT, Reike A, Reimer V, Schumann M, Hallek M, Taaffe DR, Newton RU, Galvao DA. Effects of physical exercise on breast cancer-related secondary lymphedema: a systematic review. *Breast cancer research and treatment*. 2018 Feb 22:1-3.
- [2] Karki A, Simonen R, Malkia E, Selfe J: Efficacy of physical therapy methods and exercise after a breast cancer option: a systematic review. *Crit Rev Phys Rehabil Med* 13: 159–190, 2001.
- [3] Hayes S, Sipio TD, Rye S, Lopez JA, Saunders C et al (2011) Prevalence and prognostic significance of secondary lymphedema following breast cancer. *Lymphat Res Biol* 9(3):135–141.
- [4] Mortimer P (2013) Arm lymphoedema after breast cancer. *Lancet Oncol* 14:423–442.
- [5] DiSipio T, Rye S, Newman B, Hayes S (2013) Incidence of unilateral arm lymphoedema after breast cancer: a systematic review and meta-analysis. *Lancet Oncol* 14:500–515.
- [6] Liebl ME, Preiß S, Pögel S et al (2014) Elastic tape as a therapeutic intervention in the maintenance phase of complex decongestive therapy (CDT) in lymphedema. *Phys Med Rehabil Kuror* 24:34–41.
- [7] Runowicz CD, Leach CR, Henry NL, Henry KS, Mackey HT, Cowens-Alvarado RL, Cannady RS, Pratt-Chapman ML, Edge SB, Jacobs LA, Hurria A, Marks LB, LaMonte SJ, Warner E, Lyman GH, Ganz PA (2016) American Cancer Society/American Society of Clinical Oncology Breast Cancer Survivorship Care Guideline. *J Clin Oncol* 34(6):611–635.
- [8] Keilani M, Hasenoehrl T, Neubauer M, Crevenna R (2016) Resistance exercise and secondary lymphedema in breast cancer survivors a systematic review. *Support Care Cancer* 24(4):1907–1916.
- [9] Nelson NL (2016) Breast cancer-related lymphedema and resistance exercise: a systematic review. *J Strength Cond Res* 29:2656–2665.
- [10] Paramanandam VS, Roberts D (2014) Weight training is not harmful for women with breast cancer-related lymphoedema: a systematic review. *J Physiother* 60(3):136–143.
- [11] Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gotzsche PC, Ioannidis JPA et al (2009) The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Med* 6(7):1000100.
- [12] Box RC, Reul-Hirche HM, Bullock-Saxton JE, Furnival CM. Physiotherapy after breast cancer surgery: results of a randomised controlled study to minimise lymphoedema. *Breast cancer research and treatment*. 2002 Sep 1;75(1):51-64.
- [13] Devoogdt N, Geraerts I, Van Kampen M, De Vrieze T, Vos L, Neven P, Vergote I, Christiaens MR, Thomis S, De Groef A. Manual lymph drainage may not have a preventive effect on the development of breast cancer-related lymphoedema in the long term: a randomised trial. *Journal of physiotherapy*. 2018 Sep 18.
- [14] Baumann FT, Reike A, Hallek M, Wiskemann J, Reimer V. Does Exercise Have a Preventive Effect on Secondary Lymphedema in Breast Cancer Patients Following Local Treatment-A Systematic Review. *Breast Care*. 2018.

- [15] Rafn BS, Hung S, Hoens AM, McNeely ML, Singh CA, Kwan W, Dingee C, McKeivitt EC, Kuusk U, Pao J, Van Laeken N. Prospective surveillance and targeted physiotherapy for arm morbidity after breast cancer surgery: a pilot randomized controlled trial. *Clinical rehabilitation*. 2018 Jun; 32(6):811-26.
- [16] Lacomba MT, Sánchez MJ, Goñi ÁZ, Merino DP, del Moral OM, Téllez EC, Mogollón EM. Effectiveness of early physiotherapy to prevent lymphoedema after surgery for breast cancer: randomised, single blinded, clinical trial. *Bmj*. 2010 Jan 13;340:b5396.
- [17] McKenzie DC, Kalda AL. Effect of upper extremity exercise on secondary lymphedema in breast cancer patients: a pilot study. *Journal of clinical oncology*. 2003 Feb 1;21(3):463-6.
- [18] Leach H, Danyluk J, Culos-Reed S. Design and implementation of a community-based exercise program for breast cancer patients. *Current Oncology* 2014;21(5):267.
- [19] Miedema B, Easley J. Barriers to rehabilitative care for young breast cancer survivors: a qualitative understanding. *Supportive Care in Cancer* 2012;20(6):1193-1201.
- [20] Cantarero-Villanueva I, Fernández-Lao C, Cuesta-Vargas AI, Del Moral-Avila R, Fernández-de-las-Peñas C, Arroyo-Morales M. The effectiveness of a deep water aquatic exercise program in cancer-related fatigue in breast cancer survivors: a randomized controlled trial. *Archives of physical medicine and rehabilitation*. 2013 Feb 1;94(2):221-30.
- [21] Carter SJ, Hunter GR, McAuley E, Courneya KS, Anton PM, Rogers LQ. Lower rate-pressure product during submaximal walking: a link to fatigue improvement following a physical activity intervention among breast cancer survivors. *Journal of Cancer Survivorship*. 2016 Oct 1;10(5):927-34.
- [22] Vardar Yağlı N, Şener G, Arıkan H, Sağlam M, İnal İnce D, Savcı S, Çalık Kutukcu E, Altundağ K, Kaya EB, Kutluk T, Özışık Y. Do yoga and aerobic exercise training have impact on functional capacity, fatigue, peripheral muscle strength, and quality of life in breast cancer survivors?. *Integrative cancer therapies*. 2015 Mar;14(2):125-32.
- [23] Burnham TR, Wilcox A. Effects of exercise on physiological and psychological variables in cancer survivors. *Medicine and science in sports and exercise*. 2002 Dec 1;34(12):1863-7.
- [24] McNeely ML, Campbell KL, Rowe BH, Klassen TP, Mackey JR, Courneya KS. Effects of exercise on breast cancer patients and survivors: a systematic review and meta-analysis. *Cmaj*. 2006 Jul 4;175(1):34-41.
- [25] Campbell KL, Kam JW, Neil-Sztramko SE, Liu Ambrose T, Handy TC, Lim HJ, Hayden S, Hsu L, Kirkham AA, Gotay CC, McKenzie DC. Effect of aerobic exercise on cancer-associated cognitive impairment: A proof-of concept RCT. *Psycho-oncology*. 2018 Jan;27(1):53-60.