



Is weight-training exercise intervention harmful to women with or at risk of breast cancer related lymphedema?



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SUMMARY

- Background
- Aim
- Material and Methods
- Results
- Discussion
- Conclusion



BACKGROUND

- Breast cancer is the most common malignancy among women
- About one in five people treated for breast cancer develop lymphedema later on
- Breast cancer-related lymphedema can be debilitating and it is characterized by the accumulation of fluid in the interstitial tissues in the arm, shoulder, neck or torso and attributed to the damage of lymph nodes during breast cancer treatments involving radiation and axillary node dissection



Resistance exercise training has recently shown promise in the management of breast cancer-related lymphedema



AIM



- To assess the safety and efficacy of progressive resistance training in breast cancer
- To determine if breast cancer survivors can perform resistance exercise training at sufficient intensities to elicit gains in strength without causing breast cancer-related lymphedema flare up or incidence

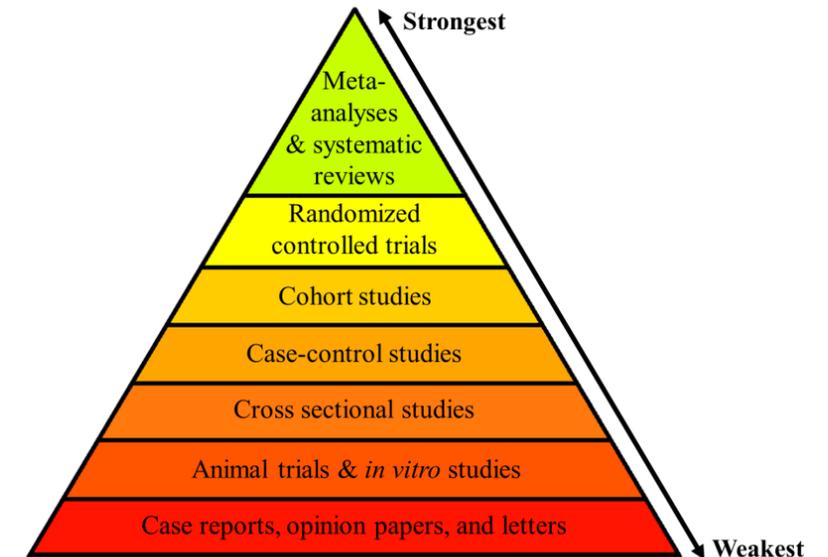


MATERIAL AND METHODS

- A systematic review of literature in Pubmed was performed
- Inclusion criteria were:
 - (1) Papers published in last five years
 - (2) Systematic reviews and meta-analysis
 - (3) Portuguese, English or Spanish language
 - (4) In Humans
- MESH Terms: lymphedema, breast cancer, exercise

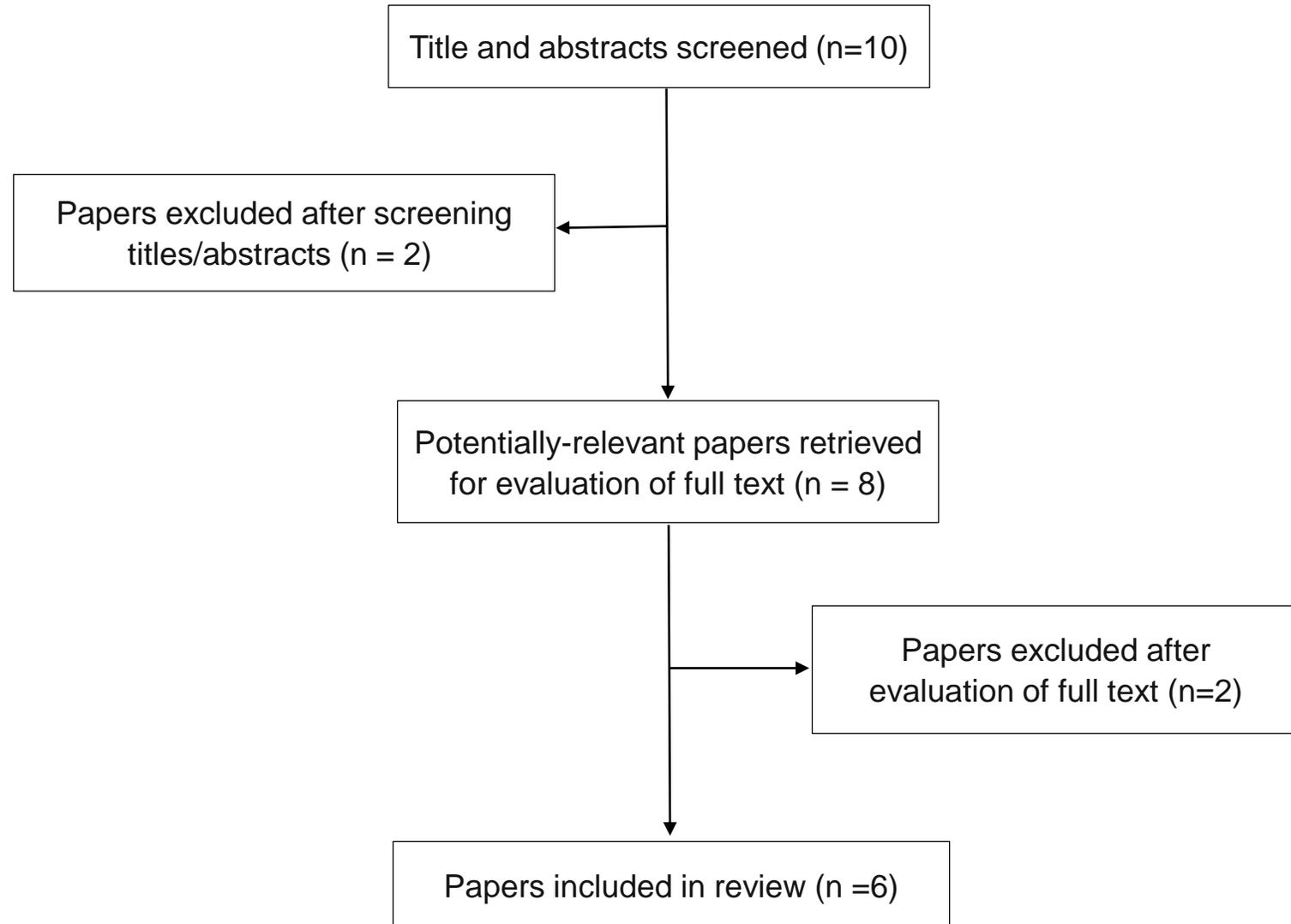


Hierarchy of Scientific Evidence



MATERIAL AND METHODS

- Flow chart of this study:



RESULTS

The following hierarchy was used to extract data for **limb volume measures**:

1. Water displacement volumetry
2. Perometry volume measurements
3. Circumference tape measurements

The following hierarchy was used to extract data for **tissue fluid status**:

4. Tissue dielectric constant (TDC)
5. Bioelectrical impedance spectroscopy (BIS)

1 Aquatic Therapy for People with Lymphedema: A Systematic Review and Meta-analysis - Wai Yeung (2017) - Lymphatic Research And Biology

Aquatic therapy versus standard care: The pooled results of two studies ($n = 66$) indicated moderate-quality evidence of no significant between-groups difference in relative lymphedema limb volume measured by the water displacement method (SMD: 0.14; 95% CI: -0.37 to 0.64, $I^2 = 0$, $p = 0.59$)

Aquatic therapy versus habitual physical activity: There was limited evidence from one study ($n = 31$) of no significant difference in perometry limb volume measurement between groups at short-term (SMD: -0.33; 95% CI: -1.04 to 0.38) and medium-term follow-up (SMD: -0.23; 95% CI: -0.94 to 0.48). In addition, there was no significant difference between-groups in tissue fluid status measured by BIS at short-term (SMD: -0.13; 95% CI: -0.83 to 0.58) and medium-term follow-up (SMD: 0.12; 95% CI: -0.58 to 0.83)

Aquatic therapy versus advise to continue exercise: Limited evidence from one study ($n = 25$) indicated no significant between-groups difference in lymphedema limb volume measured by water displacement at short-term follow-up (SMD: 0.04; 95% CI: -0.75 to 0.83). Similar result was found for tissue fluid status measured by BIS in the short-term follow-up (SMD: 0.00; 95% CI: -0.79 to 0.79)

RESULTS

HQ - High Quality
LQ – Low Quality

2 **Breast Cancer –Related Lymphedema and Resistance Exercise: A Systematic review** - Nicole L Nelson (2016) - Journal of Strength and Conditioning

Low intensity upper body RET + Flexibility: There is **limited evidence** (1HQ trial; **160 participants**) that **low intensity, shoulder RET** and flexibility exercise **elicits significantly greater strength gains** in shoulder flexion and abduction **with no change to lymphedema status** when compared to no exercise

Moderate to high intensity RET vs aerobic exercise or no exercise: There is **strong evidence** (2 HQ trials; **304 participants**) that **moderate to high intensity RET elicits significantly greater gains in strength without risk of increased lymphedema symptoms** when compared to no exercise. Further, there is **limited evidence** (1 HQ trial; **62 participants**) that **moderate to high intensity RET is superior for improving upper and lower body strength, without provoking BCRL**, when compared to moderate intensity aerobic exercise

Low intensity upper body and moderate intensity lower body RET: There is **strong evidence** (2 HQ and 1 LQ trials; **341 participants**) that **lower intensity upper body RET, combined with moderate intensity lower body RET, produces no significant increase in risk for BCRL measures, and elicits significantly greater upper and lower body strength** when compared to no exercise

RESULTS

3 Conservative interventions for preventing clinically detectable upper-limb lymphoedema in patients who are at risk of developing lymphoedema after breast cancer therapy - Stuiver MM (2015) - The Cochrane Collaboration

Two studies **compared progressive resistance training to restricted activity**

Resistance training after breast cancer treatment did not increase the risk of developing lymphoedema (RR 0.58; 95% CI 0.30 to 1.13, two studies, 358 participants) provided that symptoms are monitored and treated immediately if they occur

RESULTS

Arm volume was evaluated in all of the included studies. One or more assessment methods were used in the different studies: Water displacement volumetry was used in four articles, limb circumference measurements in six, bioimpedance spectroscopy in four, dual X-ray absorptiometry (DXA) in two, and perometry in one study.

4 Resistance exercise and secondary lymphedema in breast cancer survivors—a systematic review - M. Keilani (2016) - Support Care Cancer

[...] some observed the volume of the upper extremities in Breast Cancer Survivors (BCS) at risk of LE or included BCS both with or without preexisting LE. Independent of assessment method, **none of the studies reported significant detrimental effects of RE on LE status or risk of developing LE.**

Schmitz et al. showed that **during a 1-year weight-lifting program, the LE exacerbation rate was significantly lower in the exercise group** than in the control group and Hayes et al. even reported **absence of signs of LE in two of 32 patients with preexisting LE** by the end of the study.

RESULTS

5 Safety and efficacy of progressive resistance training in breast cancer: a systematic review and meta-analysis - Birinder S. Cheema (2014) - Breast Cancer Res Treat

Upper body exercises were initiated at low intensities and progressed according to tolerance in most studies. All studies indicated that training loads were progressively increased with strength adaptation.

Nine studies compared **Progressive Resistance Training (PRT) intervention vs usual care (no exercise)** while three studies **incorporated flexibility training** as a sham condition. The other three studies compared **PRT plus an additional intervention (i.e., calcium and vitamin D supplement, complete decongestive physiotherapy, and aerobic training)** compared to the latter intervention only.

PRT resulted in significantly lower risk of BCRL incidence/exacerbation compared with control conditions [OR = 0.53 (95 % CI 0.31–0.90)].

PRT did not change arm volume [SMD = -0.07 (95 % CI -0.28 to 0.14)] **or patient-reported severity of BCRL** [SMD = -0.07 (95 % CI -0.25 to 0.11)] compared with control conditions

RESULTS

6 **Weight training is not harmful for women with breast cancer-related lymphoedema: a systematic review - Vincent Singh Paramanandam (2014) – Elsevier**

Severity of BCRL

Although the best estimate of the overall effect on lymphedema severity favoured weight training, this was not statistically significant (SMD -0.09 , 95% CI -0.23 to 0.05). The trials in these forest plots are arranged to illustrate the subgroup analysis, which identified no considerable difference between the low-intensity and moderate-intensity subgroups

Incidence of BCRL

Although the best estimate of the overall effect on lymphedema incidence favoured weight training, this was not statistically significant (RR 0.77 , 95% CI 0.52 to 1.15). Again, subgroup analysis identified no considerable difference between the low-intensity and moderate-intensity subgroups

Upper limb muscle strength

Meta-analysis of four comparisons with upper limb strength as the outcome showed better results in the weight training group than the controls, which was statistically significant (SMD 0.93 , 95% CI 0.73 to 1.12). The low-intensity and moderate intensity subgroups again had similar results

DISCUSSION



- The evidence suggests that **progressive resistance exercise therapy does not increase the risk of developing lymphedema**, provided that symptoms are closely monitored and adequately treated if they occur
- **Strength exercise seems not to have negative effects** on lymphedema status **or might not increase risk** of development of lymphedema in breast cancer patients
- Progressive resistance training **improves physical functioning and reduces the risk** of breast cancer-related lymphedema
- There is **strong evidence** indicating that **resistance exercise training produces significant gains in muscular strength without provoking breast cancer-related lymphedema**

Nicole L Nelson. Breast Cancer –Related Lymphedema and Resistance Exercise: A Systematic (2016); Ahmed, RL, Thomas, W, Yee, D, and Schmitz, KH. Randomized controlled trial of weight training and lymphedema in breast cancer survivors (2006); Cormie, P, Pumpa, K, Galvao, DA, Turner, E, Spry, N, Saunders, C, Zissiadis, Y, and Newton, RU. Is it safe and efficacious for women with lymphedema secondary to breast cancer to lift heavy weights during exercise: a randomised controlled trial (2013); Courneya, KS, Segal, RJ, Mackey, JR, Gelmon, K, Reid, RD, Friedenreich, CM, Ladha, AB, Proulx, C, Vallance, JKH, Lane, K, Yasui, Y, and McKenzie, DC. Effects of aerobic and resistance exercise in breast cancer patients receiving adjuvant chemotherapy: a multicentre randomized controlled trial (2007); Schmitz, KH, Ahmed, RL, Troxel, A, Cheville, A, Smith, R, Lewis-Grant, L, Bryan, CJ, Williams-Smith, CT, and Greene, QP. Weight lifting in women with breast-cancer-related lymphedema. (2009); Schmitz, KH, Ahmed, RL, Troxel, AB, Cheville, A, Lewis-Grant, L, Smith, R, Bryan, CJ, Williams-Smith, CT, and Chittams, J. Weight lifting for women at risk for breast cancer-related lymphedema: a randomized trial (2010)

DISCUSSION



- Progressive Resistance Training was typically prescribed using **machine, free weights, resistance bands** and/or incorporating **a combination thereof**
- With respect to frequency, optimal training frequency likely **depends on the current fitness level of the breast cancer survivor**. However, participants performing **two to three resistance exercise training sessions per week on non-consecutive days** demonstrated statistically significant **improvements in strength** compared to control subjects
- Current evidence indicates **no significant** benefit of aqua lymphatic therapy **over** standard land-based care for improving lymphedema status or physical function in people with upper limb lymphedema. **Patient preference should guide the choice of care to facilitate adherence**

Nicole L Nelson. Breast Cancer –Related Lymphedema and Resistance Exercise: A Systematic (2016); Ahmed, RL, Thomas, W, Yee, D, and Schmitz, KH. Randomized controlled trial of weight training and lymphedema in breast cancer survivors (2006); Cormie, P, Pumpa, K, Galvao, DA, Turner, E, Spry, N, Saunders, C, Zissiadis, Y, and Newton, RU. Is it safe and efficacious for women with lymphedema secondary to breast cancer to lift heavy weights during exercise: a randomised controlled trial (2013); Courneya, KS, Segal, RJ, Mackey, JR, Gelmon, K, Reid, RD, Friedenreich, CM, Ladha, AB, Proulx, C, Vallance, JKH, Lane, K, Yasui, Y, and McKenzie, DC. Effects of aerobic and resistance exercise in breast cancer patients receiving adjuvant chemotherapy: a multicentre randomized controlled trial (2007); Schmitz, KH, Ahmed, RL, Troxel, A, Cheville, A, Smith, R, Lewis-Grant, L, Bryan, CJ, Williams-Smith, CT, and Greene, QP. Weight lifting in women with breast-cancer-related lymphedema. (2009); Schmitz, KH, Ahmed, RL, Troxel, AB, Cheville, A, Lewis-Grant, L, Smith, R, Bryan, CJ, Williams-Smith, CT, and Chittams, J. Weight lifting for women at risk for breast cancer-related lymphedema: a randomized trial (2010)

CONCLUSION

- **Weight training appears to be safe and beneficial in improving limb strength and physical components of quality of life** in women with or at risk of lymphedema
- There is **strong evidence** indicating that **resistance exercise training produces significant gains in muscular strength** without provoking breast cancer-related lymphedema



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