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Review Article (Meta-Analysis)

Effects of Resistance Training on Breast Cancer-Related Lymphedema: A Meta-Analysis

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KEYWORDS
Breast cancer-related lymphedema;
Combined therapy;
Exercise dosage;
Meta-analysis;
Rehabilitation;
Resistance training

Abstract *Objectives:* To determine the effectiveness of resistance training (RT) on the incidence, severity, and objective physiological indicators of breast cancer-related lymphedema (BCRL), and to assess its impact on limb function.
Data sources: A systematic search was conducted in PubMed, Embase, Web of Science, Medline, Sinomed, China National Knowledge Infrastructure (CNKI), Wanfang, VIP Information Co., Ltd. (VIP), and the Chinese Medical Journal full-text database from inception to August 1, 2025.
Study Selection: Randomized controlled trials involving adults with breast cancer who were at risk of or had established BCRL, and comparing RT with nonresistance exercise, usual care, or alternative management approaches. A total of 38 Randomized controlled trials involving 4843 patients were included.
Data Extraction: Two reviewers independently screened the studies, extracted data using a standardized form, and assessed the risk of bias using the Cochrane Risk of Bias 2 tool.
Data Synthesis: Statistical analyses were performed using RevMan 5.4. RT significantly reduced the incidence of lymphedema (odds ratio [OR]=0.25, 95% CI, 0.19-0.32) and moderate-to-severe lymphedema (OR=0.21, 95% CI, 0.16-0.29). It also decreased upper limb volume (mean difference [MD]=−152.37, 95% CI, −153.81 to −150.94) and circumference differences (MD=−1.51, 95% CI, −1.62 to −1.41), while improving lymphatic drainage volume (MD=5.03, 95% CI, 4.67-5.39) and the rate of excellent or good limb function (OR=4.23, 95% CI, 2.72-6.57). Subgroup analyses revealed that a short-duration, high-frequency training paradigm and combined therapy regimens produced the most pronounced protective effects.

List of abbreviations: BC, breast cancer; BCRL, BC-related lymphedema; BIA, bioelectrical impedance analysis; OR, odds ratio; MD, mean difference; RoB, Risk of Bias; RT, resistance training; RCT, randomized controlled trial; PRT, progressive resistance training.

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Conclusions: RT is a safe and effective intervention that significantly reduces the risk and severity of BCRL while improving limb volume, lymphatic function, and shoulder mobility. For optimal benefit in clinical practice, progressive RT should be delivered using a "short-duration, high-frequency" model integrated into combined therapy protocols.

Breast cancer (BC) is the most common malignancy in women worldwide.[1] BC-related lymphedema (BCRL) is a frequent and debilitating complication after surgery, particularly axillary lymph node dissection, affecting 10%-40% of patients.[2] BCRL manifests as upper limb swelling, pain, heaviness, and restricted mobility, leading to functional impairment and a marked decline in quality of life.[3]

Historically, patients were advised to avoid strenuous use of the affected limb for fear of provoking or worsening lymphedema.[4] This view has been increasingly challenged over the past 2 decades. A growing body of evidence now shows that structured exercise, including resistance training (RT), is not only safe but also offers therapeutic benefits for BC survivors, whether they have or are at risk of BCRL.[4,5] Reflecting this shift, the 2024 Chinese Anti-Cancer Association BC Guidelines include progressive RT (PRT) as a grade A recommendation for BCRL management, formally endorsing its safety and efficacy.[5]

Previous systematic reviews have confirmed that PRT does not increase BCRL risk and effectively improves muscle strength.[6-8] However, a comprehensive quantitative synthesis of its effects on key outcomes, including lymphedema incidence, limb volume, lymphatic drainage, and functional status, remains lacking. Furthermore, the optimal exercise dosage (frequency, duration, and intensity) remains poorly defined.

Therefore, this study updates the existing evidence by incorporating the most recent randomized controlled trials (RCTs). We aimed to conduct a comprehensive meta-analysis to strengthen the evidence base for traditional efficacy endpoints and to integrate objective measures, such as bioelectrical impedance analysis (BIA), to advance precision in clinical practice.

Methods

This meta-analysis was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The study protocol was prospectively registered in the International Prospective Register of Systematic Reviews (PROSPERO) (CRD420251235144). This study is a meta-analysis of published data and did not involve direct human participant recruitment; therefore, institutional review board approval was not required.

Search strategy

Systematic searches were conducted in PubMed, Embase, Web of Science, Medline, Sinomed, China National Knowledge Infrastructure (CNKI), Wanfang, VIP Information Co., Ltd. (VIP), and the Chinese Medical Journal full-text database from inception to August 1, 2025. The search strategy combined the following terms: ("Breast Cancer" OR "Breast Neoplasms") AND ("Lymphedema" OR "Lymphoedema") AND ("Resistance Training" OR "Strength Training" OR "Weight Lifting" OR "Progressive Resistance Exercise") AND ("Randomized Controlled Trial" OR "RCT"). Corresponding Chinese search terms were applied to the Chinese-language databases.

Eligibility criteria

Inclusion criteria included: (1) RCTs; (2) adults (>18y) diagnosed with BC who had undergone axillary lymph node dissection and were either at risk of or already diagnosed with BCRL; (3) the experimental group received any form of resistance exercise training; (4) the control group received non-resistance exercise, usual care, or alternative management strategies; (5) measurement and reporting of at least 1 of the following outcomes: lymphedema incidence, upper limb volume or circumference difference, lymphatic drainage, or limb function.

Exclusion criteria included reviews, conference abstracts, animal studies, duplicate publications, studies with irrelevant content or methodologically flawed designs, and those lacking complete or accessible data.

Study selection and data extraction

Two reviewers independently screened titles, abstracts, and full texts against the prespecified inclusion and exclusion criteria. Data were extracted using a standardized, prepiloted data collection form designed to capture study characteristics, participant demographics, intervention details, and outcome measures. Interrater agreement was 92% for study selection and 95% for data extraction. Disagreements were resolved through discussion or, when necessary, adjudication by a third reviewer.

Risk of bias assessment

The methodological quality of the included RCTs was independently assessed by 2 reviewers using the Cochrane Risk of Bias (RoB) 2 tool,[9] which evaluates the following domains: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, and other sources of bias.

Data synthesis and analysis

Meta-analysis was performed using RevMan version 5.4.[a] For dichotomous outcomes, odds ratios (ORs) with 95% CIs were calculated. For continuous outcomes, mean differences or standardized mean differences with 95% CIs were used.

Heterogeneity was assessed using the I^2 statistic and the chi-square test. I^2<50% and P>.1 indicated low heterogeneity, and a fixed-effect model was applied; I^2≥50% or P≤.1 indicated substantial heterogeneity, and a random-effects model was adopted.

Subgroup and sensitivity analyses were conducted to explore potential sources of heterogeneity. Publication bias was evaluated by inspecting funnel plots for outcomes reported in 10 or more studies.

For studies with multiple follow-up assessments, we extracted data from the final time point to capture the maximal or sustained effect of RT. Six of the 38 RCTs provided long-term follow-up data (6-12mo) and were included on this basis. The potential heterogeneity arising from variable follow-up timing is acknowledged in the limitations section.

Results

Study selection

The initial search yielded 851 records. After deduplication and screening, 38 RCTs with 4843 patients were included: 8 in English and 30 in Chinese (Fig. 1).

The sample size ranged from 56 to 200 patients. The mean age ranged from 35.9 to 59.5 years. Intervention duration ranged from 4 weeks to 12 months, with 12 weeks being the most common. Study details are provided in supplemental table S1 (available online only at http://www.archives-pmr.org/).

Study characteristics and RoB

The basic characteristics of the included studies are presented in supplemental table S1. Methodological quality was assessed using the Cochrane RoB2 tool.[9] Most studies had a low or moderate RoB; no study was rated as high risk across all domains. Detailed assessments are shown in supplemental figures S1 and S2 (available online only at http://www.archives-pmr.org/).

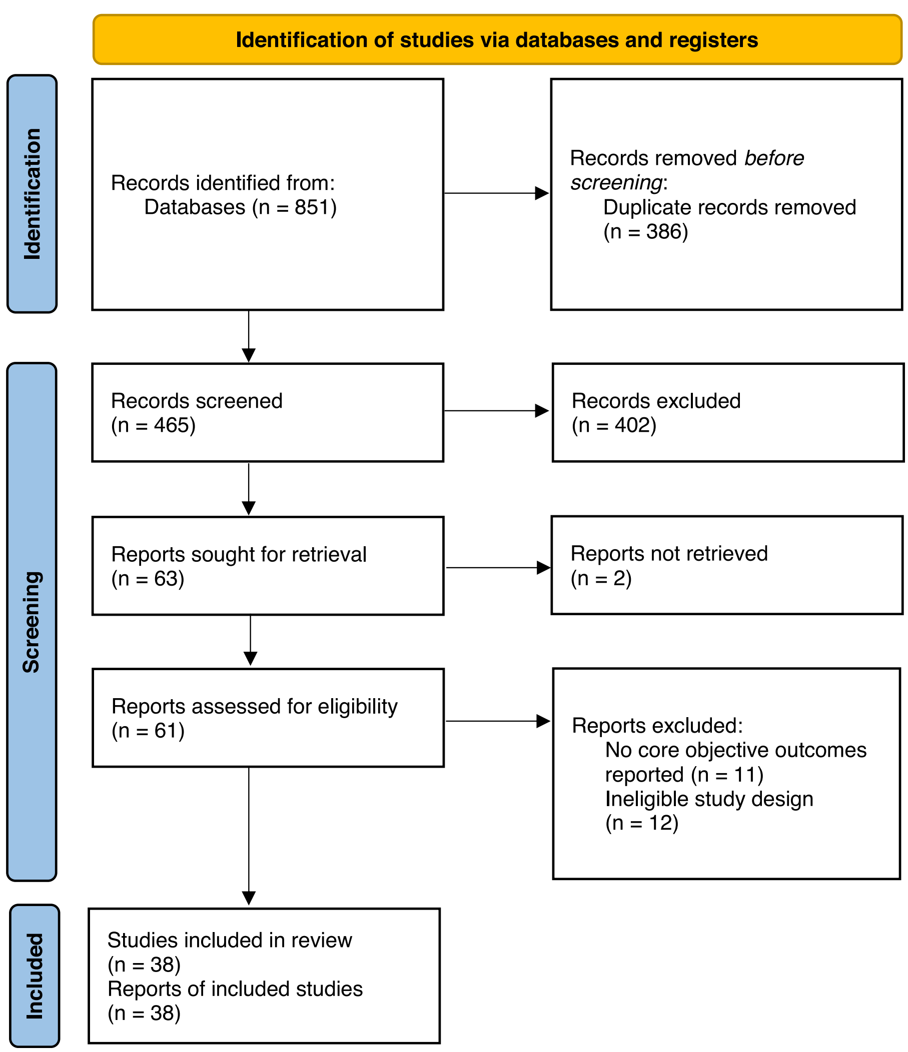

Fig. 1 Flow diagram of the literature search and selection processes.

Meta-analysis results

Lymphedema incidence and severity: incidence of lymphedema

Fourteen studies reported the incidence of lymphedema after RT. For lymphedema incidence, 178 of 1466 patients (12%) in the RT group and 320 of 1380 patients (23%) in the control group experienced an event (supplemental fig S3, available online only at http://www.archives-pmr.org/). A fixed-effects meta-analysis showed that RT significantly reduced the incidence of BCRL (OR=0.25, 95% CI, 0.19-0.33, $P<.001$; I^2=39%, P=.07). Subgroup analyses examined session duration, weekly frequency, intervention period, and total exercise volume. The strongest protective effect was observed with a "short-duration, high-frequency" regimen (≤15min/session, >7sessions/wk; OR=0.19; table 1).

Lymphedema incidence and severity: incidence of moderate-to-severe lymphedema

For moderate-to-severe lymphedema, 45 of 892 patients (5%) in the RT group and 124 of 876 patients (14%) in the control group experienced an event (supplemental fig S4, available online only at http://www.archives-pmr.org/). RT significantly reduced the risk of developing moderate-to-severe lymphedema (OR=0.21, 95% CI, 0.16-0.29, $P<.001$; I^2=35%, P=.07). Subgroup analysis indicated that PRT combined with adjunctive interventions, such as compression therapy or kinesio taping, conferred greater protection than PRT alone (OR=0.13 vs 0.25; table 1).

Lymph drainage volume of the affected limb

Thirteen studies assessed lymphatic drainage volume using lymphoscintigraphy. Meta-analysis using a random-effects model revealed a significant improvement in the RT group (mean difference [MD]=5.82, 95% CI, 4.93-6.70, $P<.001$), despite substantial heterogeneity (I^2=87%, $P<.001$; supplemental fig S5, available online only at http://www.archives-pmr.org/). Subgroup analyses indicated that interventions with a total volume >2500 minutes, a duration >8 weeks, and PRT incorporating breathing exercises were associated with more stable and pronounced effects (table 2). Sensitivity analysis confirmed robustness; after excluding 4 studies, the effect remained significant, with markedly reduced

Table 1 Pooled effect size and heterogeneity test for resistance training on the risk of lymphedema in breast cancer patients.

Indicator	Subgroup	No. of Studies	Study Population, n	Combined Effect Size: OR (95% CI)	Z	P	Heterogeneity Test: I^2	P
Incidence of lymphedema	Duration of single intervention							
	≤15 min	7	704	0.19 (0.14-0.27)	9.92	<.001	0	.51
	>15 min	5	607	0.60 (0.36-0.99)	2.02	.04	0	.67
	Weekly intervention frequency							
	≤7 times	5	607	0.60 (0.36-0.99)	2.02	.04	0	.67
	>7 times	7	704	0.19 (0.14-0.27)	9.92	<.001	0	.51
	Exercise intervention cycle							
	≤12 wk	8	838	0.31 (0.21-0.45)	6.18	<.001	0	.52
	>12 wk	4	483	0.45 (0.26-0.77)	2.89	.004	18	.30
	Total volume of exercise intervention							
	≤2500 min	6	676	0.33 (0.22-0.49)	5.30	<.001	0	.42
	>2500 min	5	575	0.42 (0.25-0.68)	3.50	.0005	1	.40
Incidence of moderate-to-severe lymphedema	Exercise intervention cycle							
	≤12 wk	5	403	0.17 (0.10-0.30)	6.15	<.001	0	.64
	>12 wk	5	1806	0.14 (0.08-0.24)	7.24	<.001	8	.36
	Total volume of exercise intervention							
	≤5040 min	4	326	0.11 (0.05-0.23)	5.66	<.001	0	.86
	>5040 min	3	1634	0.15 (0.08-0.29)	5.73	<.001	52	.13
	Intervention programs							
	Pure PRT	4	370	0.25 (0.16-0.40)	5.76	<.001	0	.76
	PRT combined therapy*	7	1960	0.13 (0.08-0.21)	7.99	<.001	0	.47
	Advanced intervention program							
	Basic RT	6	1894	0.19 (0.13-0.30)	7.65	<.001	21	.28
	Progressive load training†	5	428	0.24 (0.15-0.39)	5.77	<.001	67	.02

* "PRT combined therapy" refers to PRT combined with pressure therapy devices, kinesio taping, warm acupuncture, isokinetic muscle strength training, or comprehensive decongestive therapy.

† "Progressive load training" refers to an intervention program that clearly includes a multistage, gradually increasing load progression from pressure cuffs and elastic bands to dumbbells.

Table 2 Pooled effect size and heterogeneity test of resistance training on lymph drainage volume of the affected limb in breast cancer patients.

Subgroup	No. of Studies	Study Population, n	Combined Effect Size MD (95% CI)	Z	P	Heterogeneity Test I^2	P
Weekly intervention frequency							
≤7 times	3	267	3.97 (2.95-4.98)	7.68	<.001	33	.23
>7 times	6	446	5.34 (4.92-5.75)	25.06	<.001	0	.46
Exercise intervention cycle							
≤12 wk	3	270	7.33 (6.01-8.65)	10.09	<.001	79	.008
>12 wk	8	636	5.16 (4.70-5.62)	21.95	<.001	11	.34
Total volume of exercise intervention							
≤2500 min	3	263	3.97 (2.95-4.98)	7.68	<.001	33	.23
>2500 min	5	370	5.53 (5.07-5.98)	23.65	<.001	0	.95
Intervention programs							
Pure PRT	3	263	3.93 (3.29-4.57)	11.99	<.001	0	.43
PRT combined therapy*	6	462	5.53 (5.09-5.98)	24.44	<.001	0	.98
Baseline lymphedema status							
Preventive research	3	263	3.93 (3.29-4.57)	11.99	<.001	0	.43
Therapeutic research	7	542	5.54 (5.10-5.97)	24.92	<.001	0	.99

* The intervention involves RT with equipment combined with systematic thoracic breathing exercises, typically incorporating a 1 kg sandbag placed on the patient's chest to facilitate respiratory engagement.

heterogeneity (I^2=10%; supplemental fig S6, available online only at http://www.archives-pmr.org/).

Objective signs of the upper limb: upper limb circumference difference

For upper limb circumference difference, a random-effects meta-analysis showed a significant reduction in the RT group (MD=−1.43, 95% CI, −1.59 to −1.27, P<.001), with high heterogeneity (I^2=93%; supplemental fig S7, available online only at http://www.archives-pmr.org/). Subgroup analyses stratified by session duration, training type, and baseline lymphedema status all showed significant effects (all P<.001; table 3). Sensitivity analysis confirmed robustness; after sequentially excluding individual studies, heterogeneity decreased to 22% (supplemental fig S8, available online only at http://www.archives-pmr.org/).

Objective signs of the upper limb: upper limb volume difference

Fourteen studies assessed upper limb volume using water displacement. Meta-analysis showed a significant reduction with RT (MD=−141.81, 95% CI, −153.34 to −130.28, P<.001), with substantial heterogeneity (I^2=99%; supplemental fig S9, available online only at http://www.archives-pmr.org/). Subgroup analysis suggested that PRT was more effective than basic RT (MD=−151.86 vs −131.51; table 3). Sensitivity analysis confirmed robustness; after sequential exclusion, the effect remained similar (MD=−152.46, P<.001), with low heterogeneity (I^2=12%; supplemental fig S10, available online only at http://www.archives-pmr.org/).

Secondary outcomes (shoulder function)

RT significantly improved the range of motion in all assessed directions of the affected limb: forward flexion, abduction, adduction, extension, and internal and external rotation (all P<.05; table 4). The RT group also had a higher rate of excellent or good functional recovery (OR=4.23, 95% CI, 2.72-6.57, P<.001). Sensitivity analysis confirmed robustness; after excluding specific studies, heterogeneity dropped to ≤50% without changing the conclusions (supplemental table S2, available online only at http://www.archives-pmr.org/).

BIA outcomes

BIA is an objective method for assessing lymphedema; its derived measures include the bioimpedance spectroscopy (BIS) ratio, Lymphedema Index (L-Dex) index, and segmental frequency bioimpedance spectroscopy (SFBIS) ratio.[10,11] A qualitative synthesis of the limited available studies suggested that RT positively affected all these measures, indicating reduced extracellular fluid. Quantitative synthesis was not feasible because of heterogeneity in the reported metrics (table 5).

Publication bias

Funnel plots for outcomes with 10 or more studies (eg, lymphedema incidence) appeared roughly symmetrical, indicating a low likelihood of significant publication bias (supplemental fig S11, available online only at http://www.archives-pmr.org/). Asymmetry observed in plots for other outcomes with high heterogeneity was more likely attributable to clinical and methodological diversity rather than publication bias. Funnel plots for all outcomes are available in supplemental figs. S11−S19.

Table 3 Pooled effect size and heterogeneity test of objective signs of the upper limb in breast cancer patients undergoing resistance training.

Indicator	Subgroup	No. of Studies	Study Population, n	Combined Effect Size			Heterogeneity Test	
				MD (95% CI)	*Z*	*P*	I^2	*P*
Upper limb circumference difference	Duration of a single intervention							
	≤30 min	10	805	−1.54 (−1.85 to −1.23)	9.76	<.001	92	<.001
	>30 min	4	372	−1.38 (−1.56 to −1.21)	15.72	<.001	91	<.001
	Advanced intervention program							
	Basic RT*	7	606	−1.42 (−1.66 to −1.18)	11.62	<.001	92	<.001
	Progressive load training†	7	571	−1.43 (−1.66 to −1.20)	12.23	<.001	92	<.001
	Baseline lymphedema status							
	Preventive research‡	4	303	−1.38 (−1.65 to −1.10)	9.83	<.001	86	<.001
	Therapeutic research§	10	874	−1.45 (−1.64 to −1.25)	14.47	<.001	93	<.001
Upper limb volume difference	Advanced intervention program							
	Basic RT*	11	916	−131.51 (−133.17 to −129.84)	154.77	<.001	98	<.001
	Progressive load training†	3	230	−151.86 (−153.44 to −150.29)	189.24	<.001	93	<.001
	Baseline lymphedema status							
	Preventive research‡	3	253	−133.02 (−139.51 to −126.42)	39.55	<.001	96	<.001
	Therapeutic research§	11	893	−142.55 (−143.71 to −141.39)	240.63	<.001	99	<.001
	Integration degree of nursing models							
	Basic nursing combined with training‖	7	524	−142.01 (−143.22 to −140.80)	230.30	<.001	99	<.001
	Comprehensive intensive nursing¶	7	622	−144.44 (−147.79 to −140.91)	80.15	<.001	94	<.001

* Throughout the intervention period, training tools, loads, repetitions, and sets remained largely unchanged, focusing on enabling patients to safely maintain a baseline level of muscle activity and strength.

† Training load, resistance, or intensity was progressively increased at predefined time points or according to patient tolerance. For example, progression could involve advancing from pressure cuffs to elastic bands, then to light dumbbells, and finally to heavier dumbbells; alternatively, dumbbell weight could increase from 1 to 2 kg, aiming to provide continuous stimulation to muscles and the circulatory system, thereby promoting gradual improvements in muscle strength, endurance, and lymphatic return function.

‡ Participants did not have upper limb lymphedema at enrollment and received interventions aimed at preventing its onset.

§ Participants had a diagnosis of upper limb lymphedema at enrollment, and the intervention targeted the reduction of symptom severity.

‖ RT was delivered as an adjunct to routine or basic supportive care, with a relatively simple and unidimensional program structure.

¶ A multidimensional, phased, and structured care plan was implemented, integrating comprehensive nursing components across multiple domains.

Table 4 Summary of secondary outcomes data.

Indicator	No. of Studies	Study Population, n	Combined Effect Size I^2 (%)	Combined Effect Size *P*	Effect Model	SMD/OR (95% CI)	*P*
Flexion of the affected limb	14	1309	90	<.001	Random	1.26 (0.88-1.64)*	<.001
Abduction of the affected limb	14	1235	87	<.001	Random	1.35 (0.99-1.71)*	<.001
Adduction of the affected limb	11	989	93	<.001	Random	1.38 (0.82-1.94)*	<.001
Extension of the affected limb	13	1269	92	<.001	Random	1.55 (1.08-2.02)*	<.001
Internal rotation of the affected limb	6	572	99	<.001	Random	4.68 (2.66-6.69)*	<.001
External rotation of the affected limb	6	558	95	.006	Random	1.16 (0.32-1.99)*	<.001
Proportion of patients with excellent or good functional outcomes in the affected limb	8	669	0	.99	Fixed	4.23 (2.72-6.57)†	<.001

NOTE. The proportion of patients with excellent or good limb function is defined as "restoration of shoulder joint range of motion to more than 80% of the preoperative level."
* SMD, Standardized Mean Difference.
† OR, odds ratio.

Discussion

This meta-analysis of 38 RCTs shows that RT is safe[16] and effective for BC survivors at risk of or with established BCRL. Our findings confirm and extend prior research,[6-8] demonstrating benefits across multiple outcomes: RT reduces lymphedema incidence and severity and improves limb function.

The most significant finding is the reduction in overall lymphedema incidence (OR=0.25) and in moderate-to-severe lymphedema (OR=0.21). This supports updated clinical guideline recommendations[5] and reassures clinicians and patients about the safety of RT. The protective effect is likely mediated by enhanced muscle pump function, which promotes lymphatic and venous return[17,18] and counteracts fluid stagnation in lymphedema.

Subgroup analyses provided practice-relevant insights. The short-duration, high-frequency model (≤15min/session, >7sessions/wk) was most protective (OR=0.19). Frequent muscle pump activation, rather than prolonged sessions that may induce fatigue, appears critical for managing lymphatic load. PRT, combined with other therapies such as compression or taping, showed even greater protection against moderate-to-severe BCRL (OR=0.13). This synergistic effect

Table 5 Qualitative research results of outcome indicators related to BIA.

Indicator	Reference	Sample Size, Experimental Group/Control Group	MD (95% CI)	*P* Value	Direction of Effect	Summary of Research Conclusions
BIS ratio*	Kilbreath et al[12]	40/44	−**0.20(**−**0.32 to** −**0.08)**	.001	Favoring the experimental group	Combined training can significantly improve fluid retention on the affected side.
L-Dex index†	Li et al[13]	68/67	−**9.72 (**−**10.04 to** −**9.40)**	.001	Favoring the experimental group	RT can significantly reduce the L-Dex index.
SFBIS ratio‡	Zhang et al[14]	37/37	−**0.07 (**−**0.09 to** −**0.06)**	.001	Favoring the experimental group	Moderate- to high-intensity RT can significantly reduce the SFBIS ratio and effectively prevent lymphedema.
SFBIA ratio§	Fan et al[15]	37/37	−**0.07 (**−**0.09 to** −**0.06)**	.001	Favoring the experimental group	Moderate- to high-intensity RT can significantly improve the SFBIA ratio, demonstrating a clear preventive effect.

NOTE. The studies by Zhang et al[14] and Fan et al[15] are based on the same clinical trial cohort. Because of differences in the reported outcome measures (SFBIS vs SFBIA) and the data presented, these reports are included side by side to reflect complementary perspectives.
*BIS, bioimpedance spectroscopy.
† L-Dex, Lymphedema Index.
‡SFBIS, segmental frequency bioimpedance spectroscopy.
§ SFBIA, segmental frequency bioimpedance analysis.

supports integrated, multimodal protocols over exercise alone. Such combined approaches likely address lymphedema through multiple mechanisms: muscle contraction, external compression, and tissue mobilization.

Six RCTs reported long-term follow-up data (6-12mo). In all 6, the benefits of RT were sustained or further improved at the final assessment. This suggests that the protective and therapeutic effects of RT on BCRL may persist beyond the active intervention phase.

Improvements in limb volume, circumference, and lymphatic drainage confirmed the efficacy of RT. The high heterogeneity was expected, reflecting variability in measurement methods, patient populations, and intervention characteristics. Sensitivity analyses confirmed the robustness of these findings. Preliminary BIA findings suggest its potential for monitoring lymphedema in future research.

Study limitations

Heterogeneity remained high after subgroup analyses, suggesting residual confounding. Inconsistent reporting of BIA data prevented quantitative synthesis. Methodological quality varied across trials. Our findings are based on aggregate data; individualized exercise prescriptions warrant further investigation. Most trials did not report missing data.

Conclusions

To prevent BCRL, PRT should be considered. For patients with established lymphedema, RT reduces severity and improves limb function. The best results are achieved with a "short-duration, high-frequency" regimen (≤15min/session, >7sessions/wk) combined with other physical therapies such as compression or taping. In sum, this meta-analysis confirms that RT is safe and effective for BC survivors, and that its benefits depend on how it is delivered. Because exercise protocols varied across studies, further research is needed to standardize training programs and optimize individual prescriptions.

Supplier

a. RevMan, version 5.4; Cochrane.

Data statements

All data analyzed in this study are included in the published articles cited in this meta-analysis.

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Disclosure

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