REVIEW

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Complete Decongestive Therapy Effect on Breast Cancer Related to Lymphedema: A Systemic Review and Meta-Analysis of Randomized Controlled Trials

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Abstract

Purpose: To review and analyze critically the available evidence for Complete Decongestive Therapy Effect on Breast Cancer Related to Lymphedema. **Data Sources:** Publications were retrieved from the major database search engines, included Google scholar, EBSCO host, and PubMed database. The search terms including: "Complete decongestive therapy (CDT)", "breast cancer", "Breast cancer related to lymphedema (BCRL)" "breast surgery" and "mastectomy". **Study Selection:** The studies were initially selected based on keywords associated with inclusion criteria. Then, articles were chosen based on their titles. Then, based on the fill text and design, randomized control with a comprehensive description of the outcomes. The authors analyzed 3,181 articles, of which 15 randomized controlled trials met inclusion criteria with no publication date constraint. **Data Extraction:** Each article's authors, nations, participants, outcomes variables, measuring instruments, intervention technique and follow-up, outcomes, and results were retrieved. After reaching consensus among authors, study quality was evaluated using the Jadad scale, and risk of bias was determined using the Cochrane Rob2 tool. **Data Synthesis:** The levels of evidence were of excellent quality. The retrieved articles were of "high" methodological caliber. The major outcome variables were in QOL, pain, ROM and edema. The effect size of CDT on QOL was 2.347 (95% CI: -1.41, 6.11) (p=0.22). Pain was -0.068 (95% CI: -35.21) (p=0.64). ROM was 0.324 (95% CI: -0.44,0.09) (p=0.41) and edema was -2.9 (95% -1.53,1.11) (p=0.76). **Conclusions:** The CDT is still recommended as the primary therapy for BCRL and is regarded the most practical and cost-effective treatment for BCRL. This result recommends patients to perform CDT to improve their QOL, ROM, and to lessen pain and edema volume. To improve the body of evidence supporting the effectiveness of the CDT on BCRL, additional trials with bigger sample sizes, longer follow-ups, blindness outcomes, and patient compliance evaluations are required.

Keywords: Complete decongestive therapy (CDT)- breast cancer- Breast Cancer Related to Lymphedema (BCRL)

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Introduction

Breast cancer-related lymphedema (BCRL) is an example of secondary lymphedema, which is the most common consequence among breast cancer patients, either as a result of the disease or cancer treatments (breast cancer surgery and radiation therapy, in particular) (Leray et al., 2020). Physical symptoms encountered by patients with BCRL include itching, heaviness, edema, reduced limb function, and pain (Armer et al., 2004). Consequently, BCRL has a negative impact on patients quality of life (QOL) (Anbari et al., 2021; Mohammad and Ahmad, 2019). However, there are adjustable methods to manage these symptoms and prevent BCRL from forming for example Complete Decongestive Therapy (CDT).

Complex decongestive treatment is an intensive program that combines multiple therapeutic modalities, such as manual lymphatic drainage, bandaging, compression clothing, exercise, and self-care. CDT is used to treat stage II and stage III lymphedema, which is moderate to severe (Cheville et al., 2003) There are two phases of CDT: active and maintenance (International Society of Lymphology [ISL], 2020). The active stage aimed to reduce swelling and improve physical function (Bernas, 2001) Whereas maintenance phase aimed to sustain self-care management, limit complications, and lessen symptom exacerbation (ISI, 2020). CDT is remaining the gold standard for the treatment of early-stage BCRL. (Lasinski et al., 2012; Zuther and Norton, 2013). The results of the systematic analysis by Lasinski et al. (2012) indicated that CDT had the strongest evidence for optimal clinical practice (Lasinski et al., 2012)

Therefore, this analysis identified RCTs that administered CDT to breast cancer patients following surgery. Furthermore, it examined the effects by a systematic assessment of the literature to identify study trends that provide the most recent valid evidence for the effectiveness of CDT on BCRL. This will add to the

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presentation of future research directions on the selection of evidence-based decisions and interventions in oncology nursing practice. Thus, the purpose of this study was to critically analyze the effects of total decongestive therapy on lymphedema caused by breast cancer in patients who had undergone breast cancer surgery. Which includes volume reduction, BCRL symptom reduction, QOL improvement, and enhancement of impacted arm function through a thorough literature assessment and meta-analysis of RCTs.

Materials and Methods

Design

This systematic review and meta-analysis adhered to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) recommendations (Asar et al., 2016). To identify evidence of the effects of CDT on BCRL in postoperative breast cancer patients worldwide.

Inclusion and Exclusion Criteria

Article selection criteria were based on the PICO question. This include Participants, Intervention, Comparisons, Outcomes, and Study Design by the PRISMA group. 1) The patients with BCRL were those who received breast cancer surgery. 2) Intervention was CDT that applied on affected upper arm. 3) Comparison was a control group that did not receive CDT or received additional interventions. 4) Outcomes were studies that reported volume reduction, BCRL symptoms, QOL, and functionality of shoulders. 5) Study design was randomized control studies that employed CDT on patients with BCRL, and the published languages were limited to English without restriction for publication period.

Exclusion criteria included those diagnosed with breast cancer but not treated surgically. Studies in which the effect of only one CDT domain could not be established as well as the effect of this therapy overall were not included. Research types other than RCT (cohort study, review, meta-analysis study, case study, and qualitative study) as well as studies that failed to present or validate the intervention results or describe in detail about methods part (cases that only published posters or abstracts, or if the original text was not available) were also excluded. Gray literature, such as unreferenced papers, abstracts, and dissertations, were also excluded. English-only papers were not accepted.

Literature search and Selection

The search was only allowed to include randomized control trials, with no restrictions on publication period, and it took place between February and March 2023. In terms of database search engines, we looked through the PubMed, EBSCO, and Google Scholar databases. Complete decongestive therapy (CDT), breast cancer, breast cancer associated with lymphedema (BCRL), breast surgery, and mastectomy were some of the search phrases used. All terms were combined in the search with either the word AND or the word OR. Moreover, use of pairs in combination with AND.

Two reviewers evaluated and selected the papers independently. According to the initial keyword-based inclusion criteria, there were initially 1400 articles from Google Scholar, 1713 studies from EBSCO Host, and 68 studies from PubMed in each database. 3181 studies in all were retrieved from three databases. Based on titles alone, the reviewer independently chose 160 studies from Google Scholar (104), EBSCO Host (38), and PubMed (18). By examining the titles or abstracts, research that did not fulfill the requirements were initially discarded. Then, 40 duplicate studies that had been published in two or more databases were eliminated. The non-English papers (from Iran and Turkey) totaled 4, the letter to the editor was one, the dissertation was five, and the abstract was fifteen. As a result, 65 studies were deleted, leaving 95 studies for full text examination in accordance with the set criteria. After determining that the trial satisfied the inclusion criteria and was a randomized control study.

There were 15 RCT studies in all (Figure 1). The literature search and screening process was carried out by the first reviewer, and the outcomes were then double-checked by the second reviewer. In the event of a dispute, the two reviewers revised the original text in accordance with the inclusion and exclusion criteria until they reached a consensus on the final studies to be evaluated.

Data Extraction

In order to respond to the main query, we used a descriptive approach. This strategy includes extracting randomized control studies into a matrix in English. The following information was independently gathered by two researchers from the chosen studies: (1) the author, the publication year, and the nation; (2) the inclusion criteria for participants in various groups; (3) the number of participants in the interventional and control groups; (4) the assessment instruments; and (5) the method and treatment follow-up. (6) Indicators of success, (7) Findings, and (8) Limitation as shown in Table 1.

Quality Assessment of Selected Studies

Using the Jadad scale, we evaluated the RCTs studies' methodology. The Oxford Quality Scoring System is what it is called. It has a total of five points, including two for randomization, two for blinding, and one for withdrawal rate (Jadad et al., 1996).One point is given for each domain when the report consists only of general comments and leaves out a detailed description of randomization and blinding. When the appropriate technique is thoroughly described randomization and blinding, one point is added. conversely, if the description approach is improper, one point is subtracted (Jadad et al., 1996). Higher Jadad scores indicate better reporting, and the final score ranged between 0 and 5. Studies with a Jadad score of two or less were considered to be of poor quality, whilst those with a score of three or more were considered to be of excellent quality (Kjaergard et al., 2001).

Each study's detailed results are reported in Matrix (Table 1). On the Jadad scale, five studies had a score of 2 or less, signifying low quality, while the remaining ten studies received a score of 3 or higher, signifying excellent quality.

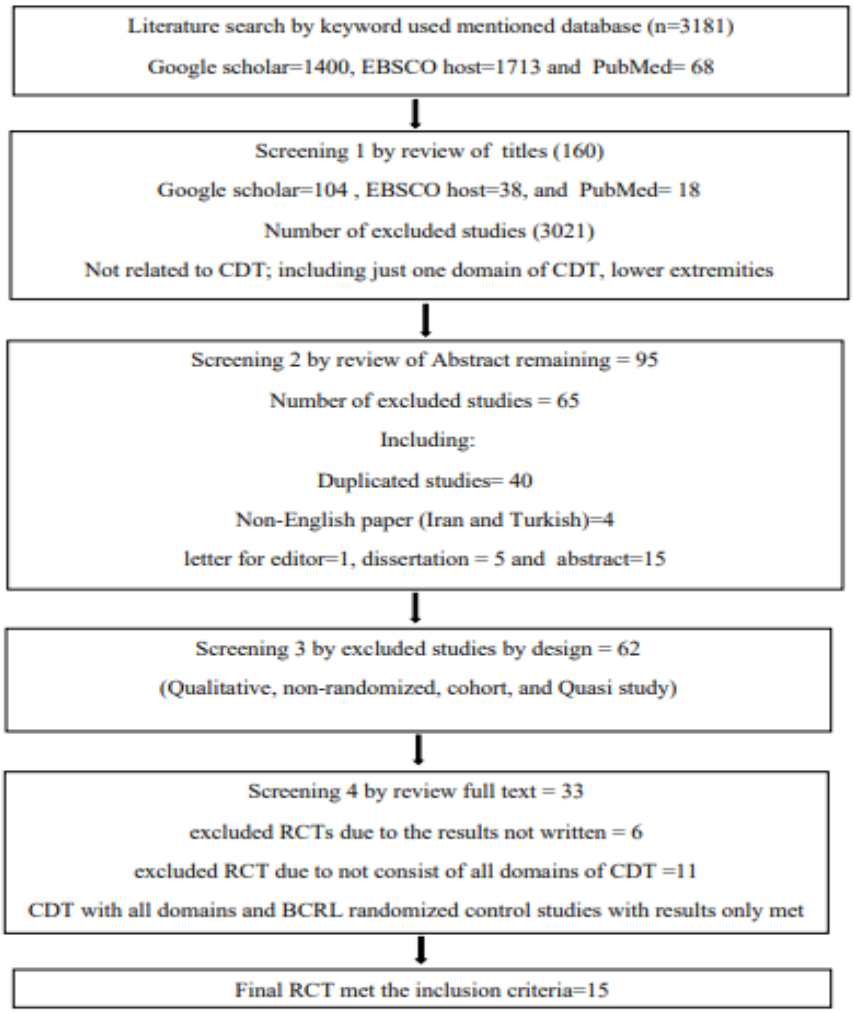

Figure 1. Studies Selection Process Flowchart for CDT Effect on BCRL Systematic Review

Risk of Bias Assessment of Selective Studies

We evaluated risk of bias using the Cochrane Rob tool (Risk of bias) Version 2.0 (Sterne et al., 2019). The five categories covered by Rob 2.0 are: bias due to the randomization process; bias due to variations from planned interventions; bias due to the lack of outcome data; bias in measuring the outcome; and bias due to the preference of the reported result (Sterne et al., 2019). Each assessment question has at least three to seven possible answers: Yes (Y), Probable Yes (PY), Probable No (PN), No (N), and No Information (NI) (Sterne et al., 2019). According to assessors' opinions, the ultimate overall outcome of each domain was divided into three categories: high, some concern, and high.

The 15 RCTs included in this analysis were initially examined by the two researchers, who then discussed their findings. The majority of analyses were in accord, but some studies had discrepancies. The researchers reviewed the findings until they came to an understanding. In addition, this study consists of a meta-analysis of RCTs.

Results

Data Analysis

15 RCTs ' effect sizes were examined. A random-effect model was used to determine the mean of the distribution of effect sizes across various populations, as these studies were carried out separately (Çoğaltay and Karadağ, 2015). Using a forest plot model, to examine the heterogeneity of the effect sizes across the studies.

Overall Features of the 15 RCTs for Analysis

Figure 1 depicts the flow of studies through the screening process. Fifteen randomized control studies in English passed screening. Tabular 1 provides information on the 15 most recent English-RCT language studies.

The studies published between 2008 and 2022. In each of the years 2000, 2008, 2010, 2012, 2013, 2015, and 2016, one study was published. Three published papers in 2014. In 2018, two papers were published. In 2019, six studies were published. Two published papers in 2020. Two research will be published in 2021, while five will be released in 2022.

The following are the nations where RCTs were conducted: Iran was the nation that gave the CDT the most consideration; four articles were undertaken there. Each of the three countries, Turkey, Egypt, and India, conducted two randomized controlled trials. Each of the five countries, including Thailand, China, Korea, Canada, and Spain, undertook a randomized controlled

Table 1. Characteristics of 15 Selected Studies

No	Author /year/ country/ Quality Jadad scale	Population Inclusion criteria	Intervention group (IG) Control group (CG)	Variables	Assessment tool	Treatment duration and procedure	Results	Weakness
1	Jafari and Adib. (2016) Iran 2/5 low quality just mention randomization and blind without mention the method	Breast cancer, history of surgery, chemotherapy and hormone replacement therapy and radiotherapy, a diagnosis of BCRL mild to severe degree passing of at least one year since ALND .	IG:21 patients received CDT and compression pumping. CG:21 patients with no treatment for BCRL.	Body image	Body Image and Relationships Scale (BIRS)	8 weeks dividing to 2 phases, Active phase : 3days /week / 4weeks. Each session lasted 60-90 minutes. MLD for 30-40 minutes and compression pump for 15 minutes. then bandaged compression and exercises and skin care. In the second phase, CDT was performed daily without compression pump for 4 weeks	The total score BIRS increased insignificantly in the intervention group and significantly in the control group. CDT did not improve body image in the intervention group,	Small sample size
2	Dayes et al. (2013) Canada 5/5 : High quality All of randomization, blindness, and withdrawal mention with methods	Patients with BCRL care in six Canadian regional cancer centers. Patients must have completed all primary and adjuvant therapy. Ongoing hormonal therapy or trastuzumab was permitted.	IG: 57 patients with CDT . 1 hr/day /MLD/4 weeks. (5 days / week) for a total of 20 sessions. Then, daily session, with compression bandages for 23 hours. CG: 46 patients with compression garments alone) consisting of a sleeve and glove .Wearing for 12 hours per day.	Arm volume CDT adherence Quality of life Arm function adverse events, such as rash and infection	arm circumferences measurments Diaries capturing Short Form-36 Health Survey Disabilities of the Arm, Shoulder, and Hand (DASH) scale National Cancer Institute Common Toxicity Criteria	Patients were assessed at baseline and 3, 6, 12, 24, and 52 weeks after. Note that the 3-week and 6-week assessments coincided with the midpoint and 1 week after completion of the massage and bandaging, respectively	95 patients were evaluable. Mean reduction of excess arm volume was 29.0% in the experimental group and 22.6% in the control group. Absolute volume loss was 250 mL and 143 mL in the experimental and control groups, respectively (difference, 107 mL; 95% CI, 13 to 203 mL; P< .03). There was no difference between groups in the proportion of patients losing 50% or greater excess arm volume. Quality of life and arm function were not different between groups. no significant difference in either the primary study outcome of percent reduction in excess arm volume or improvement in quality of life or arm function.	Variance in arm volumes was still high by using circumferential measurements . The eight patients who refused to proceed with their allocated treatment and the large variability of treatment effect may have reduced study power, loss of eight patients had little effect on the study outcome. 4 weeks of massage and bandaging cost $1,500 Canadian
3	Hou, Wu and Jin. (2008) China 3/5 : High quality Randomization and method as well as withdrawal are mentioned without blindness	50 inpatients receiving lymphedema therapy in the vascular surgery ward of Shandong Province Hospital. All patients undergone a breast cancer surgery and/no radiotherapy 5 years before.	IG 1: 15 patients received bone marrow stromal cells (BMSCs) transplantation. IG2: CDT group (35 patient, treated with only CDT)	Pain in arm and/or chest wall Volume measurements Circumferences (C) of the arms Volume of edema	A numerical scale from 0 to 5 Kuhnke's 'disk model' Measured at 4-cm intervals beginning at the wrist and ending at the shoulder. The % of edema in the arm was then calculated with the following formula: [(VI – VN)/VN] 100	The volume of edema of the affected arm was measured at the start of treatment and at 1 and 3 months and 1 year after.	Before treatment, patients had average volume of edema in the affected arm of 1166.2 ml in BMSC Group and 1091.0 ml in the CDT Group. With therapy, there was an average decrease in lymphedema volume of 730.7, 887.9 and 958.6 ml in the BMSC Group and 714.8, 657.9 and 571.3 ml in the CDT Group after 1, 3 and 12 months, respectively. Before treatment, the percentage of lymphedema was 28.6% in the BMSC Group and 26.8% in the CDT Group. After treatment, there was a decrease of 64.6, 78.5 and 81.0% in the BMSC Group and 67.2, 60.4 and 54.5% in the CDT Group after 1, 3 and 12 months, respectively. the average score of pain was 3.4 in the BMSC group and 4.0 in the CDT Group. The average score was reduced to 1.6, 0.8 and 0.6 in the BMSC Group and to 1.2, 1.7 and 1.6 in CDT Group after 1, 3 and 12 months, respectively	The length of stay was greatly shortened, Transplantation of the stem cells affects the patients' primary disease, that to say, whether it promotes relapse and metastasis of breast cancer. this study has not offered patients' conditions after 1 year and there were not enough cases, therefore further studies are needed to determine the results and adverse reactions of this therapy

Table 1. Continued

No	Author /year/ country/ Quality Jadad scale	Population Inclusion criteria	Intervention group (IG) Control group (CG)	Variables	Assessment tool	Treatment duration and procedure	Results	Weakness
4	Muñoz-Alcaraz et al. (2022) Spain 5/5 :High quality Randomization ,blindness and withdrawal all were mentioned	51 women diagnosed with BCRL in stage I and II, to different institutions in Córdoba and Aragon, Spain	IG: 26 patients received the Activity-Oriented Antiedema Proprioceptive Therapy (TAPA) treatment, which does not exert compression on the affected upper-limb CG: 25 patients followed (CDT as preventive measures.	HRQoL-Pain, tightness, heaviness, Functionality	the Upper Limb Lymphedema 27 Value (ULL-27). Self-Assessment of the Health Questionnaire of EuroQol Group (EQol-5D) was used VAS Quick DASH	The experimental group (TAPA) in stages I and II. received 10 sessions (2 weekly) of 30 min each. after 10 sessions, each patient performed prescribed activities daily and did not use any compression garments in its maintenance phase	HRQoL was significantly related to upper-limb function and pain on the participants' affected side. Covariance analysis (ANCOVA) showed that the TAPA treatment interfered less in the performance of activities of daily life and produced significant improvements in the social dimension of HRQoL.	The limited evidence about the effectiveness of removing compression garments in its maintenance phase, makes it difficult to discuss and compare the results. Small sample size Not contain women diagnosed with on stages 0 and III, and men to evaluate the effect of therapy
5	Hemmati, Rojhani-Shirazi, Zakeri, Akrami, and Dehno.(2022) Iran 4/5 : High quality Randomization, blindness were mentioned ,but write impossible to blind	39 female patients diagnosed with BCRL, in Shahid Mottahari Terapeutic Center in with history of surgery, chemotherapy or radiotherapy,>2cm difference in circumference, and /or >10% difference in volume between the affected and unaffected upper extremities.	IG1:13 (CDT therapy and faradic current) was about 1h and 20min. IG2: 13 patients received 1h CDT only) IG3: 13 patients receive CDT t and therapeutic ultrasound) was about 1h and 15min.	extremity circumference arm volume pain Shoulder disability.	circumference was measured water displacement method Numerical rating pain scale (NRPS) DASH tool	Patients in all the 3 groups received 10 sessions (5 sessions / week) CDT / 1h /day. MLD for 30min, multi-layer compression bandages were changed daily except the weekends patients kept the bandaging for 23h a day. All the subjects were educated skin care, and were also given a standard BCRL exercise program	An improvement was noted in lymphedema volume, pain, and functional disability in all the three groups and there was a significant difference between the groups (P0.05).	Convenience sample, small sample size single center, thereby limiting the ability to generalize the results study was designed to determine the treatment effects after 10 sessions of treatment with no further follow-ups
6	Sing, Dhar, Srivastava, Kumar ,and Pandey.(2019) Indian 3/5 : High quality Randomization and withdrawal were mentioned but blindness not mentioned	18 patients were randomized into two groups	IG: Silicone group (n = 8) received the placement of fenestrated silicone tubes subcutaneously from the hand to scapular region along with standard compression therapy CG: n = 10) received standard compression therapy only	Limb upper volume, girth, Pain-free range of motion in the upper limb in both the groups. Quality of life	Water displacement technique, circumference measurement Goniometer at all major joints of upper limb. Vascular Doppler, Quality of life (LYMQOL-Arm)	IG: All patients received injection benzathine penicillin G 1.2 mu deep IM 3 weekly, received standard therapy along with placement of silicone tube. The average duration of surgery was 45 min; Follow-up was done at week 1, 2, 4, 12, and 24 CG: received daily skincare and limb elevation, shoulder and chest wall stretch exercises, MLD) with Vodder technique everyday 30–45 min/ 5 days/week, and compression bandaging for initial 2 weeks after that compression garments in daytime and bandaging during night.	A mean reduction of limb volume in the silicone group was 887 ml (25%), whereas in the control group, it was 250 ml (8%) (P = 0.01). All patients, 8 (100%) of silicone group and only 4 (40%) of control group, had ≥10% limb volume reduction at the end of 24 weeks with P = 0.013. and reduction in limb circumference of ≥2 cm as compared to the control group at almost all points of measurements along the limb with P < 0.05. There was a significant improvement in the QOL, especially the functional domain in the silicone group with a P = 0.01. Improvement in pain-free range of motion in all major joints was observed in both the groups.	Small sample size Invasive procedure Need physicians to insert tubes.
7	Park, Lee, Kwon, and Seo .(2019) Korea 2/5 : Low quality Just randomization was mentioned, blindness or withdrawal were not mentioned	38 patients diagnosed with BCRL received breast cancer treatment	CG: 19 in the CDT group IG:19 in the group Cervical stellate ganglion block(SGB)	Changes in circumference, Volume, of whole Arm QOL Pain	measured at 10 cm below and above the cubital crease between the medial and lateral epicondyle. perometer EuroQol- (EQ-5D) questionnaire and EuroQol (VAS)	IG:19 patients underwent 3 consecutive SGB (once every 2 weeks) CDT group had 10 sessions of CDT administered in 2 weeks, each session lasted for 40 mins and consisted of MLD (15 mins), bandaging (15 mins), exercise (10 minutes) Variables were measured at baseline and 2 weeks after treatment	In both groups, difference of circumference was decreased significantly from baseline (P < 0.05), and difference of volume was reduced significantly in the SGB group (P < 0.05). Results of the EQ-5D, EQ VAS, and subjective symptoms administered at baseline and 2 weeks revealed no statistically significant difference in the treatment effects between CDT and SGB.	Single center, Further long-term follow-up studies with a greater number of patients that include analysis according to the severity and duration of symptoms are needed

Table 1. Continued

No	Author /year/ country/ Quality Jadad scale	Population Inclusion criteria	Intervention group (IG) Control group (CG)	Variables	Assessment tool	Treatment duration and procedure	Results	Weakness
8	Dhinakaran,Jain, Benjamin, ParamdeepKaur, and Dhinakaran. (2014) Ludhiana, India 1/5 : Low quality Just mention randomization without method , blindness or withdrawal were not mentioned	45 females who post mastectomy with BCRL more than 2 cm circumference than normal side.	One group No control group	Oedematous limb Quality of life	Modified truncated cone method. European organization for research and treatment of cancer quality of life questionnaires - core 30 questions (EORTC- LYMQLQ ARM- C 30)	Intensive phase of CDT which included skin care, MLD for 45 mins, compression sleeve with the pressure of 23 to 32 mm Hg was applied 23hrs / daily. Exercise included movement of glenohumeral joint for 5 mins .Deep abdominal breathing exercise 3 -5 times, After a month (maintenance phase) CDP with isotonic exercise of shoulder, elbow and wrist muscles for 50 – 60 % of 10RM 8-10 times / twice in a day and stretching exercise for follow up every month, up to 3 months	Volume was reduced by 80.22 (95% CI: -96.71 to -63.73) from baseline to 3rd month ($p<0.0001$) There was significant mean change in QOL at 2nd month as compared to baseline [69.95 (95% CI: 66.49 to 73.42); $p<0.0001$). Volume of affected limb was similar to the normal limb at 3rd month (normal limb: 312.38±82.20 vs. affected limb: 324.44±82.19; $p=0.48$) CDT is effective in BCRL and improves the quality of life and required to assess the effectiveness of self-management under supervision	Absence of control group which meant that effects of CDT on the QOL could not be distinguished from the effects of simply participating in a clinical research studies. Need a greater number of subjects and longer duration of follow up. also QOL should be assessed in the improvement of various domains, to compare the effects of different modalities of therapy on those.
9	Abbasi et al. (2018) Iran 3/5 : High quality Randomization and withdrawal were mentioned but blindness was not mentioned	31 women with post-mastectomy with BCRL attending Seyed Khandan Rehabilitation Clinic (Tehran, Iran) from January to May 2013	CG:15 cases who received CDT The first phase:60 mins/ session 6 days/ week (excluding Fridays) for 3 consecutive weeks. Second phase: At home using brochure and CD for self-MLD and exercises and wearing sleeve during the day IG: 16 who received RCDT before each CDT session. Contraction of muscle for 5–7 seconds and then relax them 10 seconds	Edema volume, Anxiety and depression	Water displacement method Hospital Anxiety and Depression Scale (HADS)	Edema volume, anxiety and depression scores were compared at the first and last sessions of the first phase of the treatment and six weeks afterwards. The difference in outcomes between the first and third weeks of therapy compared to the initial value was taken as the changes accomplished in the first phase. The patients were followed up between the 3rd and 9th weeks of the treatment. outcome was calculated based on the changes in outcome between the 1st and 9th weeks of the treatment	The edema, anxiety and depression scores were 63.6%, 54.1% and 65.5% in the RCDT group and 60.7%, 31.4% and 35.2% in the CDT group. There were significant differences between the two groups in terms of the reduction in depression ($p = 0.024$) and anxiety ($p = 0.011$) scores throughout the study. This significant relationship was due to the differences in the depression score at the 3rd, and anxiety level in 9th weeks of the study between the two groups ($P = 0.013$)	Costs of adding relaxation to CDT and the need for training personnel should be considered in future cost-effectiveness studies.
10	Haghighat, Lotfi-Tokaldany, Yunesian, Akbari and Weiss.(2010). Iran 3/5 : High quality Randomization and withdrawal were mentioned but blindness was not mentioned	112 patients referred to the Lymphedema Clinic of the Iranian Center for Breast Cancer in 2008	IG:60 CDT Group: Phase I consisted of skin care, 45 mins MLD , exercises, and compression multilayer IG2: 60 modified MCDT plus IPC : 10-15 minutes MLD pneumatic sleeve, and ICP set at 40 mm Hg pressure for 30 minutes	Volume of edema Pain, heaviness paresthesia	Water displacement method Afour-point scale questionnaire ranging between 0-3	Phase I daily treatment was administered 5 days a week for 10-15 sessions. In the maintenance phase, both groups were educated to apply CDT . These consisted of compression by a low stretch elastic sleeve with compression worn during the day and bandaging at night, skin care, continued remedial exercise, and repeated light self-massage one or two times/day for completed three months of follow up.	During the phase I of treatment, CDT alone yielded a significantly higher mean volume reduction than the combination modality (43.1% vs. 37.5%; $p = 0.036$). Limb volume measured three months following treatment, showed 16.9% volume reduction by CDT alone, and 7.5% reduction by MCDT plus IPC. This study demonstrated that the use of CDT alone, or in combination with IPC significantly reduced limb volume in patients with post mastectomy lymphedema.	Further studies will help to define the role of multidisciplinary approaches in the management of postmastectomy lymphedema. Need more period to follow up

Table 1. Continued

No	Author /year/country/ Quality Jadad scale	Population Inclusion criteria	Intervention group (IG) Control group (CG)	Variables	Assessment tool	Treatment duration and procedure	Results	Weakness
11	Rostom & El Sayed. 92019) Egypt 1/5 : Low quality Just written randomization without mention to the method	30 Participants with BCRL post total mastectomies that were treated in Surgery Clinic.	IG1: (n=15) received Kinesio taping (KT), Bandage and MLD IG2: (n=15) received Pneumatic Compression Pump (PCP), 30 minutes Bandage and MLD	Edema assessment	(Tap Measurement) initial visit and after 8 weeks of treatment at olecranon level, 5 Cm above olecranon and 5 Cm below the same reference point	Participants received 3 sessions / week for 8 weeks.	There was a significant improvement in both groups by using two different methods of treatment but there was no significant difference between the two study groups (p value = o.36) So Combination therapy is recommended to achieve better improvement.	Small sample size and short term follow up
12	Pekyavas, Tunay, Akbayrak, Kaya, and Karatas. (2014) Turkey 5/5 :High quality , all of randomization, blindness and withdrawal were mentioned.	45 patients who admitted to Bas kent University Hospital, Ankara, Turkey with the complaints of edema, pain, limitations in daily living activities, discomfort, heaviness, tension, stiffness, numbness and were diagnosed with grade 2 and 3 BCRL.	IG1:15 CDT included skin care, 30-min MLD, 15-min multilayer compression bandage, and a 20-min exercise IG2: 15 CDT including MLD, compression bandage, skin care and exercise but application of Kinesio Tape® Lymphatic Correction Method was done under the bandage. IG 3 : 15 CDT including MLD, skin care and exercise but Kinesio Tape® Lymphatic Correction Method was used instead of a bandage application	BCRL symptoms such as pain, limitations in daily living activities, heaviness, tension, stiffness numbness Volume reduction Quality of life	Visual Analog Scale (VAS). Circumferential measurements in centimeters on bilateral upper extremities at 5 cm intervals Short-Form 36 (SF36)	Patients were assessed before, at the end of the treatment (10th day) and at control period (1 month after the end of treatment)	No significant difference was found between three groups in all measurement parameters ($p > 0.05$.Symptoms were decreased in all three groups ($p < 0.05$). CDT was found effective only during treatment in arm volume ($p < 0.05$). Kinesio Taping® applied CDT had effect of decreasing edema after 10 days of treatment period ($p < 0.05$) and for control period ($p < 0.05$). Only the application of Kinesio Taping® group also had significant decrease at edema ($p < 0.05$). Kinesio Taping® Application along with CDT may have a better effect on decreasing BCRL	Kinesio Tape® is a one-time use product, but the bandage can be reused. A cost effectiveness analysis might be considered in clinical practice Kinesio Tape® can make an allergic reactions in sensitive skins. Patients may not have done exercises at home or may not have worn compression garments properly during the control period and this could affect findings Small sample sizes
13	Tatar & Turhan.(2022) Turkey 3/5 : High quality Randomization and withdrawal were mentioned but blindness not mentioned	30 patients unilateral breast cancer who developed adhesive capsulitis after lymphedema and underwent mastectomy surgery at least one year before were diagnosed with stage II adhesive capsulitis,	IG: = 15 patients, 45 minutes of CDT with the adhesive capsulitis treatment CG:15 patients	Pain assessment Functionality ROM Edema assessment volume of the arm	VAS ranging from 0 (no pain) to 10 (Q-DASH) An isokinetic dynamometer Circumference measurement Volumetric water method	Both groups received 20 minutes of exercise 5 days/week for 3 weeks using a Biodex isokinetic dynamometer, as well as a hot pack and TENS (Transcutaneous Electrical Nerve Stimulation) treatment to the shoulder join. For the treatment of adhesive capsulitis in both groups, for 3 weeks, 5 days a week, (a) 20 minutes of heat was applied to the shoulder joint with a hot pack, (b) 20 minutes of exercise was performed with the Biodex isokinetic exercise system, and (c) 20 minutes conventional TENS (Transcutaneous Electrical Nerve Stimulation) as applied to the shoulder joint and the painful points around it.	Both groups had improvements in pain ($P < 0.001$), shoulder joint range of motion ($P < 0.001$), and upper extremity functionality ($P < 0.001$) after the treatment. There was a significant decrease in circumference and volumetric measurements in the study group ($P < 0.001$). However, no differences were seen in measurements in the control group	Single-center study with a small sample size. the COVID-19 pandemic there was a small volunteer patient group who wanted to receive treatment. pharmalogical treatment differences of patients. DASH tool was not developed specifically for the shoulder problems after breast cancer treatment. It is a general tool for shoulder functionality

Table 1. Continued

No	Author /year/country/ Quality Jadad scale	Population Inclusion criteria	Intervention group (IG) Control group (CG)	Variables	Assessment tool	Treatment duration and procedure	Results	Weakness
14	Sithawatdecha Chotiyarnwong & Pajareya .(2019) Bangkok, Thailand 5/5 : High quality Randomization ,researcher blindness and withdrawal methods ,all were mentioned	51 patients with stage 1 or 2 BCRL were enrolled during December 2017 and December 2018	IG: self-care booklet plus routine care and record their self-monitor routine in the booklet weekly CG: receives routine care alone for 12 weeks	Arm volume Quality of life Range of motions Patients' knowledge	water displacement Lymph-ICF Goniometer Similar test at each visit	Outcome measurements were performed at baseline (week 0), week 4 and at week 12.	Intervention group demonstrated signifi cantly higher score in the physical sub-scale of the Lymph-ICF toll (p=0.046) after using for 4 weeks. After 12 weeks, there were significant increases in ROM in the intervention group but after 12 weeks, there were no between groups was found in terms of arm ROM, volume reduction, knowledge score, overall satisfaction,	Small sample size
15	Mokhtar, Omar, Alawady, Abdelrahman and Omar. (2020). Egypt 2/5 : low quality just randomization was mentioned , blindness or withdrawal not written	40 females having unilateral post mastectomy grade 2 or 3 BCRL at physiotherapy unit at Kasr Alainy Center of clinical Oncology and Nuclear Medicine, Cairo University from May 2015 until January 2016	IG 1:20 patients with unilateral BCRL received CDT 5 days/ week for 4 consecutive weeks. IG 2: - 20 patients with BCRL received Low Level LASER Therapy (LLLT) 5 days / week for 4 consecutive weeks	Volume measurement HRQL	Circumferential assessment using a tape measurement The ULL-27 is a self-report questionnaire	The % reduction of affected limb volume was not significantly better in CDT group compared to LLL group (p-value 0.16). The percentage improvement of HRQL physical score was 15.81% in group LLL which is border line significantly less than improvement in group A (38.42%), p-value = 0.05. The percentage improvement in HRQL psychological score was not significantly different between both groups p-value = 0.92). % improvement of HRQL social score (21.08 % in group CDT) is border line significantly better than group LLL (12.6%), (p-value = 0.08). The time needed for CDT ranged from 65 to 80 minutes while LLLT application time was 20 - 23 min. which is highly significantly shorter (p-value < 0.000**).	This study highlights the need for medical and healthcare professionals to include LLLT as an effective therapeutic tool in the management young female patients with post mastectomy upper extremity lymphedema specially in the absence of too much workload.	CDT group and details about the nature of LLLT were not provided in this preliminary report.

Table 2. Risk of Bias Assessment for 15 RCTS by Cochrane Rob 2 Tool

No	Study	Randomization process	Deviations from the intended interventions	Missing outcome data	Measurement of the outcome	Selection of the reported result	Overall results
1	Hou et al. (2008)	Low	Some concern	Low	Low	Low	Low
2	Haghighat et al. (2010)	low	low	low	low	low	low
3	Dayes et al. (2013)	Low	Some concern	high	Low	Low	Some concern
4	Dhinakaran et al.(2014)	Some concern	Some concern	low	low	Low	low
5	Pekyavas et al. (2014)	Low	Low	Low	Low	Low	Low
6	Jafari and Adib (2016)	Low	Low	Low	Low	Low	Low
7	Abbasi et al. (2018)	low	low	low	low	low	low
8	Park etal. (2019)	Low	Low	Low	Low	Low	Low
9	Rostom and El Sayed.(2019)	Some concern	Some concern	low	low	low	low
10	Sing et al. (2019)	Low	Low	Low	Low	Low	Low
11	Sithawatdecha et al.(2019)	Low	Low	Low	Low	Low	Low
12	Mokhtar et al. (2020)	Low	Some concern	Low	Low	Low	low
13	Hemmati et al. (2022)	Low	Low	Low	Low	Low	Low
14	Muñoz-Alcaraz et al. (2022)	Low	low	Low	Low	Low	Low
15	Tatar and Turhan (2022)	Low	Some concern	Low	Low	Low	Low

trial. Critically, Egypt is the only Arab nation that have performed research on the CDT.

In 15 RCTs, 733 persons took part (minimum group size: 8, maximum group size: 60, average group size: 24). These people had been diagnosed with BCRL, had had breast cancer surgery, were getting chemotherapy or radiation therapy, and were in a rehabilitation center. In the intensive phase and the maintenance phase, people with BCRL got complete decongestive therapy (CDT). There are three groups in each of the two studies (Pekyavas et al., 2014; Hemmati et al., 2022)). One study contains one interventional group without control to follow up (Dhinakaran et al., 2014).

Follow-up times were very different between studies because they used different outcome variables, tools for measuring, and more than one intervention. Patients were followed for up to a year in two studies (Hou et al., 2008; Dayes et al., 2013) One studies followed patients for up to 6 months (Singh et al., 2019).Three studies followed patients for up to three months (Haghighat et al., 2010; Dhinakaran et al., 2014; Sithawatdecha et al., 2019). The remaining studies follow up 2 weeks, 3 weeks, 4 weeks, 5 weeks, 6 weeks, and 8 weeks. All 15 studies show that CDT is either a “control” or an “interventional” group.

Identical names for CDT were used in RCTs, such as “decongestive lymphatic therapy” (Dayes et al., 2013), standard therapy (Singh et al., 2019), complex decongestive physiotherapy (Hou et al., 2008),’complex

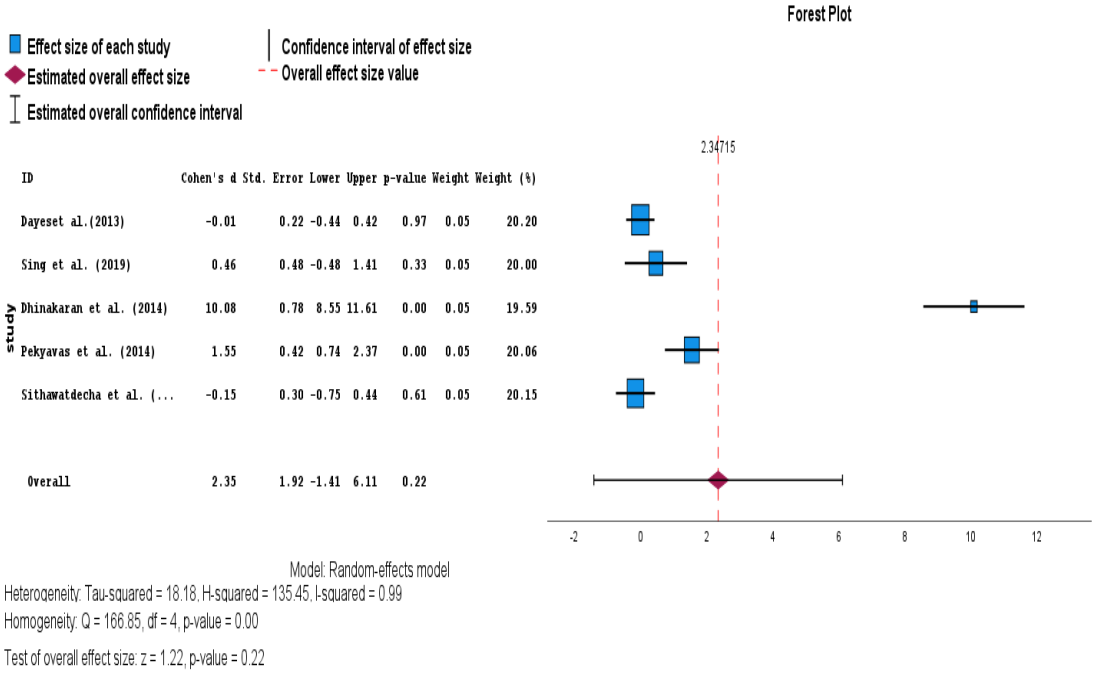

Figure 2. Meta-Analysis with Forest Plot for the Quality of Life Studies

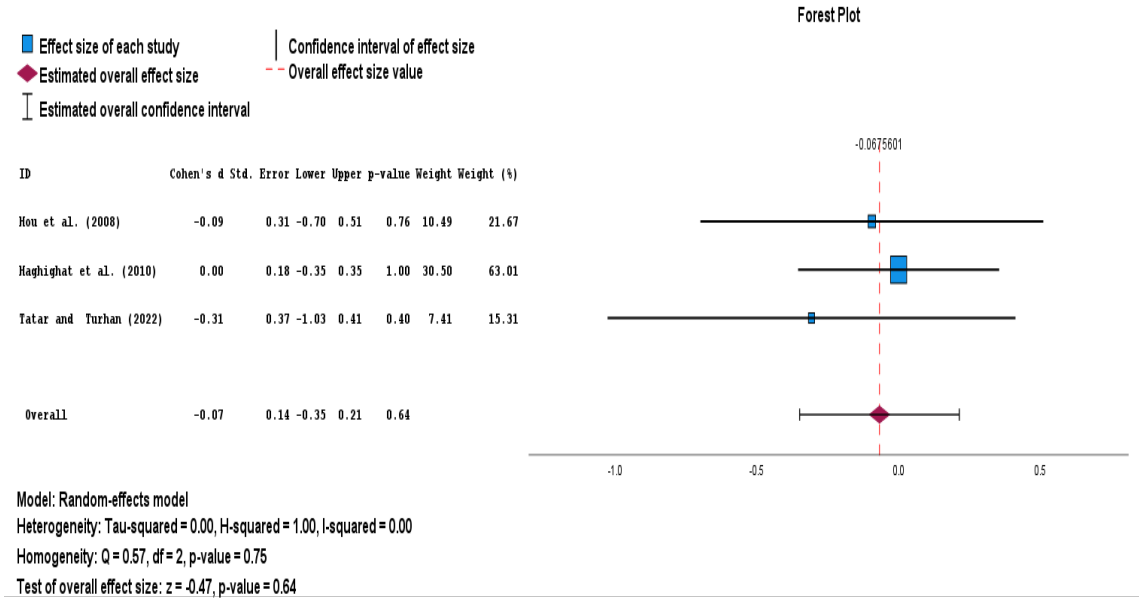

Figure 3. Meta-Analysis with Forest Plot for the Pain Studies

decongestive therapy'(Haghighat et al., 2010; Park et al., 2019; Hemmati et al., 2022; Tatar and Turhan, 2022), comprehensive therapy (Abbasi et al., 2018), and 'routine care'(Sithawatdecha et al., 2019).

Physical characteristics were the most important outcome variables. Instances include edema volume assessment presented in 12 studies, circumference measurement in 5 studies, upper extremity function in 4 studies, range of motion in 3 studies, health status, heaviness and tension symptoms in 2 studies, pain in 7 studies and QOL presented in 6 studies. Some studies described psychological variables, including sadness, anxiety, body image, and patients' satisfactions. Few studies reported both patient knowledge and adherence.

The idea to conduct a meta-analysis for significant variables was put forth in three or more research. As a result, there were not enough research to draw conclusions because they didn't give the mean and standard deviation and only gave data from three groups, making it difficult to decide which interventional study should be assessed. Pain, edema volume, QOL, and ROM all underwent meta-analysis.

Results of Methodological Quality Assessment

Five studies were rated as being of low quality. The other ten studies were of outstanding caliber. Insufficient information on random selection methods was the primary issue with the RCTs in two trials (Dhinakaran et al., 2014; Rostom and El Sayed, 2019) While just 12 studies inadequately described the procedures leading to blindness, there were no reports of double blinding, and the bulk of the studies' studies did not provide enough information regarding the mechanism of blinding (Houet et al., 2008; Haghighat et al., 2010; Dayes et al., 2013;

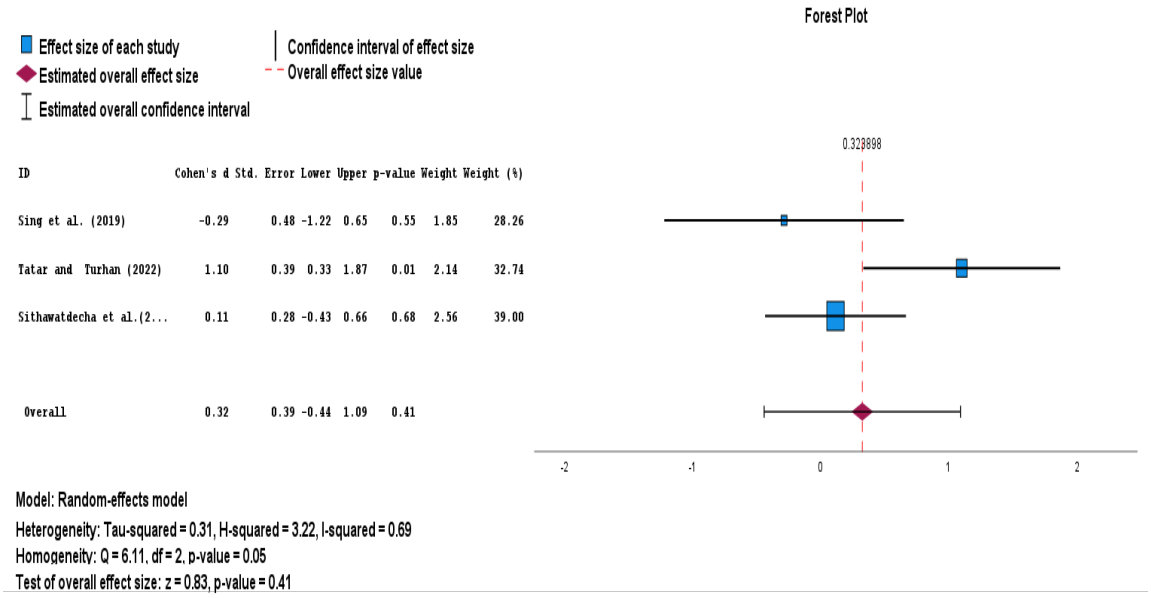

Figure 4. Meta-Analysis with Forest Plot for the Range of Motion Studies

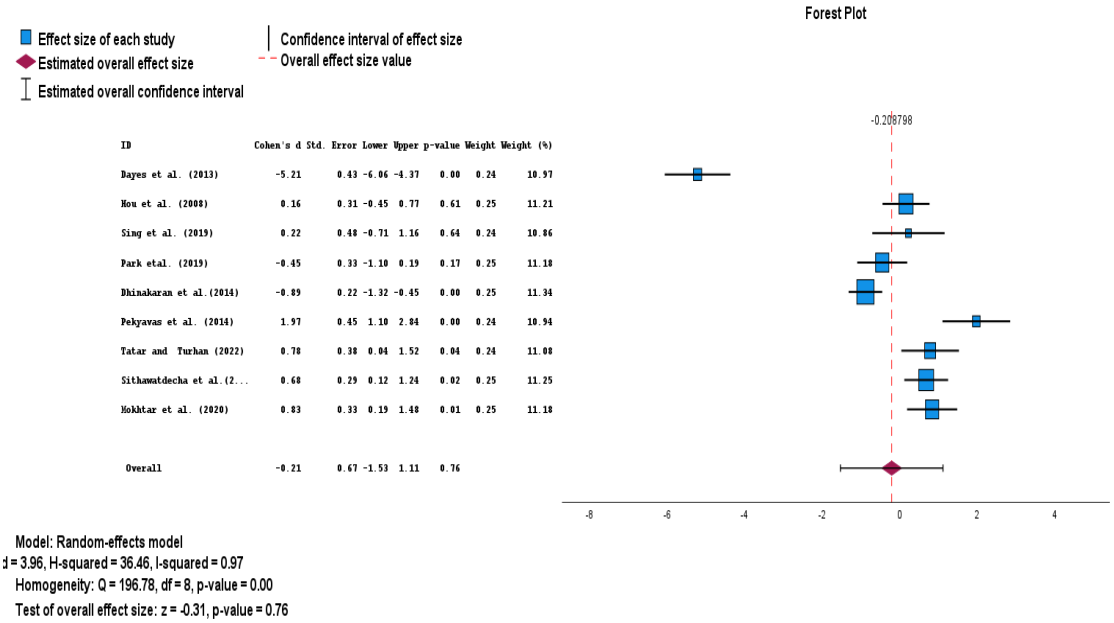

Figure 5. Meta-Analysis with Forest Plot for Oedema's Volume Studies

Dhinakaran et al., 2014; Jafari and Adib., 2016; Abbasi et al., 2018; Park et al., 2019; Rostom and El Sayed, 2019; Sing et al., 2019; Mokhtar et al., 2020; Hemmati et al., 2022; Tatar and Turhan, 2022). Moreover, five studies did not include information about dropout rate or the reasons for it during follow up (Dhinakaran et al., 2014; Jafari and Adib, 2016; Park et al., 2019; Rostom and El Sayed, 2019; Mokhtar et al., 2020).

Result of Risk of bias

The majority of research (13 out of 15) described computer random number, block randomization, card, and table randomization in their descriptions of the randomization procedure, yielding the outcome "Low risk of bias" as the first problem. Only two out of 15 RCT trials did not include a detailed description of the randomization processes.

The second problem is evaluation bias, which is caused by treatment variations. Four research explicitly outline the blinding process. Although two studies explicitly state that they are blind by using the word "blind" in the title or method section, more information is still required to describe the process of blindness. The remaining reports for the double-blind questions were not explicit in all 9 papers. Due to a lack of explicit blinding of the intervention clearly and in details, six out of fifteen RCTs expressed some concern about the bias of the intended intervention. The remaining 9 studies exhibited modest bias risk.

The third problem was that 14 out of 15 studies responded "Yes (Y)" when asked "were data for this outcome available for all, or almost all," yielding a 93 percent "Low" rating for bias brought on by missing outcome data. One study's dropout rate was identified as having a significant risk of bias because the missing subject affected the study's conclusion (Dayes et al., 2013). For the fourth issue, the score was "Low" (100%) for bias in the way the outcome was measured. All of the studies used reliable and valid structured questionnaires that were filled out by the participants themselves. Furthermore, machines like tape measures and perometers were used to measure the physical outcomes. Goniometer and the Volumetry method. All were thought to be good tools. So, making sure that assessors don't get in the way of the evaluation and measuring variables at least twice or three times are all ways that RCTs try to reduce measurement errors.

On the fifth issue, there was "Low" (94%) evidence of bias in how the results were chosen. Because all 14 studies did a good job of summarizing what they found. In conclusion, the 14 RCTs out of the 15 studies had a low risk of bias as a whole. However, one of the studies caused some concern because a participant dropped out, which made the study less powerful. After looking at the quality of the literature in 15 RCTs, it was decided that the total risk of bias was "Low" as shown in Table 2.

The effect of CDT includes exercise, MLD, compression therapy and skin care on BCRL as following:

CDT Effect on BCRL Versus Supportive Therapy Results

In BCRL, CDT is efficient and enhances QOL evidence by volume decreased from the baseline to the third month ($p < .0001$) as well as the mean difference in QOL between CDT group versus control group was significantly different ($p<.0001$) in study conducted in 2014 (Dhinakaran et al., 2014). Additionally, CDT had beneficial effects on limb volume, QOL, and function (Dayes et al., 2013). Another study compared the effect of standard therapy versus Activity-Oriented Antiedema Proprioceptive Therapy (TAPA) without using compression therapy. The findings of this research did not indicate any variations in BCRL volume reduction between both groups. All patients experienced volume reduction ($Z = 463.0$, $p = .61$). While social component of HRQoL substantially improved under TAPA treatment (Muñoz-Alcaraz et al., 2022).

Regarding self-application of CDT at home, after four

weeks of use, the self-care pamphlet paired with traditional CDT demonstrated some benefits for women with stage 1 or 2 BCRL, as measured by an increase in their QOL physical subscale score. In terms of limb ROM, volume reduction, satisfaction scale, and adverse events, however, there was no difference between the CDT treatment alone at home after 12 weeks. However, CDT did not improve the subjects' body image (Sithawatdecha et al., 2019).

To compare CDT to other treatments or complementary therapies for the management of BCRL. On BCRL, 10 studies compared the effectiveness of CDT versus further therapy. The first study revealed that autologous bone marrow stromal cell transplantation (BMSCs) is effective and feasible for the treatment of BCRL. After 1, 3, and 12 months, it can considerably reduce the size and proportion of lymphedema as well as the pain caused by swelling. Despite the fact that both BMSC and CDT reduce the extent of the edema and the intensity of the discomfort, BMSC is more effective (Hou et al., 2008).Combining CDT with silicone tubes used as artificial lymphatics results in a more pronounced decrease in limb volume and circumference as well as an increase in overall QOL, notably in the function portion, with no noticeable adverse effects (Singh et al., 2019). According to another study, the difference in circumference between the cervical stellate ganglion block (SGB) and cervical disc therapy (CDT) groups decreased significantly from baseline (P<.05) in both groups, and the difference in volume was significantly lowered in the SGB group (P< .05). Although there is no significant difference between CDT and SGB in terms of therapeutic effects on QOL and pain perception, there is a difference (Park et al., 2019).

Concerning the evaluation of relaxation technique as a complementary therapy, there were significant differences between the two groups in terms of anxiety reduction when relaxation without CDT was compared to relaxation with CDT (p=.011) and depression (p=.024) ratings. Unfortunately, relaxing with CDT exhibited minimal effects on edema volume in patients compared to CDT alone (Abbasi et al., 2018). In addition, improvements in lymphedema volume, discomfort, and functional impairment were observed in all three groups, regardless of whether CDT was administered alone or in conjunction with electrotherapy modalities such as faradic current or ultrasound. However, when CDT is paired with electrotherapy, persons with BCRL can see a greater reduction in lymphedema volume, discomfort, and functional impairment (Hemmati et al., 2022).

Another study conducted by Haghighat and his colleagues in 2010, showed that affected limb volume was substantially decreased when CDT was used alone or in combining with Intermittent Pneumatic Compression (IPC) (Haghighat et al., 2010). Moreover, both CDT with Kinesio taping (KT) and CDT with a pneumatic compression pump (PCP) increased limb volume, although there was no noticeable difference between the two groups (p=0.36) (Rostom and El Sayed, 2019). Nonetheless, the combination of Kinesio Taping and CDT reduced swelling much more than CDT alone (p<0.05). Consequently, this method was regarded a substitute treatment for the management of BCRL (Pekyavaş et al., 2014). Neither CDT nor Low Level LASER Therapy (LLLT) significantly decreased the volume of the afflicted limb or raised the psychological HRQL score in young patients with postmastectomy BCRL. The rise in physical and social HRQL ratings increased modestly. LLLT is carried out in significantly less time than CDT in the LLL group (p<0.001), and it is advised in centers with heavy workloads (Mokhtar et al., 2020).

Patients with BCRL-induced adhesive capsulitis were divided into two groups: CDT with adhesive capsulitis treatment (n = 15) and control (n = 15). There were improvements in both groups' pain levels following treatment (P< 0.001), shoulder's range of motion (P< 0.001), and upper limb functionality (P< 0.001). The interventional group's circumference and volumetric values both significantly decreased (P< 0.001). However, data in the control group showed no changes (Tatar and Turhan, 2022).

Finally, CDT is still the major treatment for BCRL. Although CDT has a positive effect on BCRL, it has a larger effect on arm volume, upper arm function, BCRL symptoms, and QOL when combined with other treatment. However, CDT with extra therapy also considers the need for interdisciplinary teams, intrusive procedures, and increased expenses.

Results of Meta-Analysis for Sub-groups

The effects of CDT on QOL

Five of the 15 studies included in this systematic review focused on QOL. In meta-analysis, the forest plot displayed a graphical representation of the results (Figure 2). The plot depicts the effect size in a diamond shape, with a value of 2.347 (p=.22) and a confidence interval ranging from -1.41 to 6.11. The plot depicts the Cohen's d effect size of the individual studies for the observed outcomes, along with their 95% confidence intervals.

The effects of CDT on Pain Level

Three of the 15 studies included in this systematic review have a pain focus. The meta- analysis with forest plot displayed the findings graphically (Figure 3). A diamond-shaped plot of the effect size with a value of -.068 (p=.64) and a confidence interval of between -35 and.21 is shown. The plot displays the Cohen's d effect sizes for the individual studies' observed outcomes along with their 95% confidence intervals.

The effects of CDT on ROM

The ROM has been the focus of three of the 15 studies in this systematic review. In meta-analysis, the forest plot was a graph that showed the results (Figure 4). The effect size is shown in the shape of a diamond with a value of.324 (p=.41) and a confidence interval of -.44 to 1.09. The plot shows the Cohen's d effect sizes of the observed results from each study, along with their 95% confidence intervals.

The effects of CDT on Oedema Volume

In this systematic review, nine of the fifteen studies focused on the oedema volume. The forest plot displayed a graphical representation of the results in meta-analysis

(Figure 5). The effect size is represented as a diamond with a value of -2.9 (p=.76) and a confidence interval ranging from -1.53 to 1.11. The graph depicts the Cohen's d effect size of the individual studies for the observed outcomes, along with their confidence intervals at 95 percent.

Discussion

This review included fifteen articles on CDT treatment that matched the inclusion criteria. In general, the strength of the evidence was quite strong. Because all research involved randomized controlled trials, well-controlled therapies, and unbiased evaluations of the influence on arm volume, upper limb function, BCRL symptoms, and QOL. Typically, the retrieved publications had "excellent" methodological quality. Although the majority of publications did not mention blinding of the assessors of findings, our interpretation of the responses to the primary question was typically unaffected by blindness.

We segment articles into categories for meta-analysis. Park et al., (2019)'s study was rejected because it lacked a mean and standard deviation, therefore only five studies were chosen for QOL (SD). Three studies on pain were chosen out of a total of seven for a meta-analysis, leaving out four studies, two of which had three groups, and the remaining studies lacked mean and SD to help interpret the results. To do a meta-analysis, we chose to include all three studies that examined range of motion. We chose nine studies out of a total of twelve for the edema volume evaluation, leaving out three due to insufficient data to support the conclusions, and including three groups in the study. The same psychological variables were also used in fewer research; hence the relevant variables were dropped from the meta-analysis. We used the Cochrane Rob tool (Risk of bias) Version 2.0 to examine the sensitivity analysis for variables in the meta-analysis. After assessing the standard of the literature in 15 RCTs, the overall risk of bias was determined to be "Low."

There are several advantages to the RCTs in this study that evaluate the effect of CDT on BCRL. Typically, BCRL is unilateral, allowing the normal limb to serve as a comparative limb. Second, there is a clear etiology, allowing for the formation of more homogenous research groups. As a result, we conclude from this analysis that CDT consisting of all domains is effective for reducing excess volume of edema, reducing symptoms of BCRL, and boosting upper arm function, and enhancing QOL as demonstrated in both review articles and current

Limitation

The limitations of this review were: small sample sizes, short duration of treatment, inadequate long-term follow-up, a lack of assessor blinding in the majority of studies, no reported men with BCRL to assess the effect of therapy, lack of reported CDT adherence, and lack of consideration of the negative impact of radiotherapy or chemotherapy on CDT application, which resulted in insufficient power and necessitated additional research.

In conclusion, we may now move on to building therapeutic balance in the random assignment of treatments with CDT with and without supportive therapies, areas that are appropriate for further research, according to this systematic review. Future RCTS should use blinded outcomes assessors, a larger sample size, and longer treatment follow-up. Additionally, long-term research was done to determine the safety and side effects of this therapy. Future study is required to ascertain how well patients adhere to CDT therapy and assess compliance of the patients by diary self-record in order to validate the efficacy of existing therapeutic recommendations. Additionally, more investigation should be done to compare the cost-effectiveness of conventional CDT and additive supportive treatments. Economic statistics on clinical outcomes over the short and long term are needed in order to inform health policy makers. As a result, the findings of this review serve as the foundation for future research, which will add to the body of knowledge needed to treat patients as effectively as feasible.

Author Contribution Statement

The authors confirm contribution to the paper as follows: review thought, background, design, discussion and conclusion: Shaimaa. Running meta-analysis analysis and interpretation of results: Prof. Muayyad. Selection literature, assessment of methodological quality, assessment of risk of bias and draft review preparation: Shaimaa and Prof. Muayyad both researchers reviewed the results and approved the final version of this review and meta-analysis..

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Ethical approval

The study was approved by the IRB committee at the School of Nursing at the Jordan University.

Availability of data

Data are accessible upon request.

Finally, we would like to thank God, for letting us through all the difficulties.

Conflict of interest

The authors declare no conflicts of interest.

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