

# A systematic review of the effect of low-level laser therapy in the management of breast cancer-related lymphedema

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## Introduction

Breast cancer-related lymphedema (BCRL) is common following breast cancer treatment with incidence ranging up to 34 % (1, 2). Untreated BCRL can result in both physical and psychological problems, leading to reduction in activities of daily living and quality of life (3, 4).

There are a variety of interventions for management of BCRL, including pharmaceuticals (16), physical (6-10) and laser therapy (11-18). The first published paper about the use of low-level laser therapy (LLLT) as a treatment for BCRL was in 1995 (11). Despite a recent increase in the research interest for the use of LLLT in the management of BCRL, there is a scarcity of empirical evidence to back different clinical methods (19), including LLLT for the management of BCRL (20).

This review was conducted to critically appraise the published research to assess the effectiveness of LLLT in the management of BCRL.

## Materials & Methods

English language publications from 1990 to 2011, from seven databases were searched using keywords, breast

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cancer, lymphedema, low-level laser therapy, low-energy laser, and low-intensity laser. A manual search of the reference lists in the chosen articles was performed, for additional articles that met selection criteria.

## Inclusion criteria and outcome measures

Randomized controlled and uncontrolled studies on women with unilateral lymphedema following breast cancer treatment, without recurrent malignancy, were included. In the selected studies, LLLT was compared to no treatment, placebo, or other therapies such as pneumatic pump and manual lymph drainage. The volume and circumference of unaffected upper limb were served as control for comparison with the treated affected limb.

## Review criteria and assessment of methodological quality

Levels of evidence of selected studies were categorized according to Sackett's rules of evidence (SRE) (21). Whereas methodological quality was assessed with the PEDro scale, based on the Delphi list (22), that has good reliability among rater (ICC=0.68), (23). The cutoff point was 5,

Authors	Eligibility criteria	Random allocation	Con-cealed allocation	Baseline comparability	Blinded subjects	Blinded therapists	Blinded assess-sors	Adequate follow up	Intention-to-treat analysis	Between-group analysis	Point estimates of variability	Total Score	Level of evidence
Piller & Thelander <sup>(11)</sup> 1996	Yes	No	No	No	No	No	No	No	No	No	Yes	1	III
Piller & Thelander <sup>(12)</sup> 1998	Yes	No	No	No	No	No	No	No	No	No	Yes	1	III
Carati et al. <sup>(13)</sup> 2003	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	9	II
Kaviani et al. <sup>(14)</sup> 2006	Yes	Yes	No	Yes	Yes	Yes	No	No	No	Yes	No	5	II
Kozanoglu et al. <sup>(15)</sup> 2009	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes	6	II
Lau et al. <sup>(16)</sup> 2009	Yes	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	6	II
Dirican et al. <sup>(18)</sup> 2010	Yes	No	No	No	No	No	No	Yes	No	No	Yes	2	V
Omar et al. <sup>(17)</sup> 2011	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	7	II
	8/8	5/8	2/8	5/8	4/8	2/8	2/8	5/8	0/8	5/8	7/8		

Tab. 1: Quality assessment of the included studies according to the PEDro scale and level of evidence.

where the PEDro scale of less than 5 indicates low quality and PEDro score of 5 or higher indicates high quality.

## Results

Using the pre-defined keywords and search of databases showed a total of 10 publications. Two studies were descriptive clinical reports and were excluded. Finally, eight papers met the inclusion criteria. Based on SRE, five studies (13-17) were classified as level II, two studies (11,12) as level III, and one study (18) as level V. Based on PEDro scale, methodological quality of five papers (13-17) had 5 points or more, and other three papers (11,12,17) had less than 5 points as listed in Table1.

## Discussion

This paper has provided an overview of LLLT and the relevance of its research findings to lymphedema. A number of observations are possible. The first is that, the study of the application of LLLT to lymphedema is following a pattern similar to that of LLLT as a whole: small, uncontrolled studies (11, 12) followed by larger and better designed trials (13, 18). The second, a variety of factors should be considered for the recommendations based on the available evidence in the use of LLLT in the management of BCRL. These include staging and defini-

tion of lymphedema, laser parameters, and individual varying. Third, the levels of evidence and the methodological quality must be considered together before making decisions regarding the effectiveness of LLLT for the management of lymphedema.

## Conclusions

The analysis of available data based on studies with an acceptable methodological quality show that there is moderate to strong evidence for the effectiveness of LLLT for the management of BCRL. LLLT dose of 1-2 J/cm<sup>2</sup> per point, applied to several points covering the fibrotic area can reduce limb volume following BCRL. Further well-designed, large-scale studies are required to establish the role of LLLT in the treatment of BCRL.

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