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 cancer, lymphedema, low-level laser therapy, low-energy laser, and low-intensity laser. RCTs and non-RCTs were included. The search was performed using keywords related to breast cancer, lymphedema, and low-level laser therapy. Inclusion criteria for studies were: randomized controlled trials, non-randomized controlled trials, and non-randomized controlled trials with a control group. The search was performed using keywords related to breast cancer, lymphedema, and low-level laser therapy. Inclusion criteria for studies were: randomized controlled trials, non-randomized controlled trials, and non-randomized controlled trials with a control group.

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 (1CC=0.68), (23). The cutoff point was 5,
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 definition 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/cm² 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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