Effects of Weight Lifting on Exacerbation of Lymphedema in Breast Cancer Survivors with Axillary Lymph Nodes Dissection

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Introduction

The purpose of this paper is to describe the development process of evidence based recommendations about weight lifting (WL) on breast cancer survivors with lymphedema related to surgical interruption of axillary lymph nodes. It provides an overview of the incidence of breast cancer, and breast cancer related-lymphedema (BCRL). Also it describes the breast cancer primary treatment that increases the incidence of developing lymphedema, evaluates the current evidences. Next, details are given of WL recommendations developed by the author.

In the current practice; women were instructed to avoid WL in the affected arm to decrease the incidence of lymphedema. In 2005, the National Lymphedema Network guidelines stated that strength training “poses the greatest risk to individuals with lymphedema” (Stephan, 2009). However; in 2011, National Lymphedema Network guidelines regarding lifting exercise was changed to: “All of these types of resistance exercise may be utilized by individuals with lymphedema, but should be done cautiously”. For the time being those guidelines are giving cautious recommendations; Despite that arm swelling ranks high among the serious concerns of the breast cancer survivors. Therefore; breast cancer survivors with lymphedema limit the use of their affected arm out of fear, and on basis of the guidance from commonly accessed cancer information web sites (http://mylifewithlymphedema.blogspot.com/2005/12/guidelines-on-lymphedema.html).

Incidence rate of breast cancer related lymphedema in the United State and in Jordan

During 2012 an estimated 226,870 new cases of invasive breast cancer are expected to occur among women in the United State (US), and it ranks the second of the ten most common cancers in the US (Cancer facts & figures, 2012). However; it ranks number one of the females’
ten common cancers in Jordan from year 1996 till 2009, and account for 36.8% of all Jordanian females’ cancers (Jordan Cancer Registry, 2009). Furthermore; Death rates for breast cancer in the US have steadily decreased in women since 1990, with larger decreases in younger women from 2004 to 2008 (Cancer facts & figures, 2012) which gives an indication to look for the complications of breast cancer treatment, and survivors concerns.

**Significance of BCRL**

The reported incidence rates of BCRL varies from 4% to 56% (McLaughlin et al., 2008; Paskett, Naughton, McCoy, Case, & Abbot, 2007; Ramadan, 2008; Shih et al., 2009). However; In Jordan there are no sufficient researches give a clear picture about lymphedema incidence. This complication limits the range of motion; increase the pain, weakness, or stiffness of the affected arm (Fu, Ridner, & Armer, 2009). Furthermore, it may affects psychological status including anxiety, depression, sexual dysfunction, social avoidance, and exacerbation of existing psychiatric illness (Loudon & Petrek, 2000; Paskett et al., 2007; Ridner, 2002). Also appearance can be affected, which had been suggested to be greater than the effect of coping with the initial diagnosis and treatment of breast cancer. The survivors considered it as a constant reminder of breast cancer; a subject of curiosity to others; and they may think of recurrence (Paskett et al., 2007; Rockson & Rivera, 2008). Furthermore; lymphedema may result in added healthcare costs to patients, including treatment costs, and financial loss related to lymphedema influences on their ability to do their jobs (Shih et al., 2009).

**Primary treatment and its side-effects**

The standard treatment for breast cancer is surgery; the type and time of surgical options varies depending on the disease stage. One of these surgeries is; modified radical mastectomy which considered the standard treatment for locally advanced breast cancer. However; Breast
conservation surgeries such as wide local excision or lumpectomy are the preferred options, but not the definite for patients with less extensive cancer (Blichert-Toft, Nielsen, During, Moller, Rank, Overgaard, & Mouridsen, 2008). Although advanced cancer treatment increases the survival rate (Winer et al., 2008), patients still need to deal with the end result difficulties of treatment that affect their quality of life and health status (Beurskens, van Uden, Strobbe, Oostendorp, & Wobbes, 2007).

Exercise has proven its effectiveness and is commonly used as an intervention to improve the physical health of cancer patients after treatment (Hays, Reul-Hirche, & Turner, 2009; kilgour, Jones, & Keyserlingk, 2008; Portela, santaella, Gomez, & Burch, 2008; Toress et al., 2010). However; WL using the arm with lymphedema had controversies between the published guidelines and common practice.

**PICO Summary**

P – Patient population of interest: Breast cancer survivor with axillary lymph node dissection.

I – Intervention of interest: Controlled WL among breast cancer survivors using the arm at same site of lymph node dissection.

C – Comparison of interest: Breast cancer survivors do control WL using the arm at the same side of lymph node dissection, with breast cancer survivors with no control of weight lifting.

O – Outcome of interest. Incidence or /and exacerbation of lymphedema; as manifested by changing in the measurement of the arm circumference.

**PICO questions:** Among breast cancer survivors who underwent a surgical treatment with lymph node dissection: Is WL using the arm at the same side of lymph node dissection increases the incidence or exacerbated lymphedema?
Methods

Search Strategies: A literature search for this evidence based project was performed in the OVIDSP database from 2006 to March 2012; this data base searched the following databases: “Nature, Thomson Reuters Healthcare, Springer Books, Springer Protocols, Elsevier Procedure Consult, Springer Journals, Ovid, Wiley, and Springer BioMedical & Life Science Journals”; The Pubmed database; and the Cochrane Library from 2006 to March 2012. Keywords used in the search strategy were: ‘breast cancer’, ‘lymph node dissection, ‘lymphedema’, ‘weight lifting’. The keywords with ‘weight lifting’ were separated using the word ‘AND’. Articles describing the effect of exercise on the shoulder movement post-surgery were excluded by entering the term ‘NOT’ in the search strategy. The titles and abstracts obtained from the search were assessed for relevance. To be included the article had to meet the following criteria: 1. Study on adults; 2. Had large sample size; 3. High level of evidence; 4. Effect of WL is evaluated; 5. article is written in English. There was no restriction on the type of report or the design of the study. A secondary search was performed by hand searching the reference lists from the collected reviews and relevant articles. The articles were analyzed by the current author, and reviewed by the course advisor. The current author collected information about the number of included patients, study design, intervention type, setting, data collection tools, efficacy and adverse effects of WL on lymphedema. The methodological quality of the individual studies (Appendix- table 2) was rated according to the rating system for the hierarchy of evidence (Melnyk & Fineout-Overholt, 2005).

Assessing the evidence

Evidence quality: One systematic review study had included 19 articles within the period from 2004 to 2010; this study had reviewed two systematic reviews, two literature
reviews, 13 randomized control trials (RCT), and two case series with comparison group. All studied the effects of exercise and WL on BCRL (Appendix, table 1). This evidence is at higher level of evidence, and ranks level one. However; the other three RCTs included in this study were published during the years 2011-2012; and ranked as level two (Appendix, table 2).

The sample inclusion criteria in the articles involved in this study, were relatively the same, as included in (Table 1), and the dependent variable to be tested in all researches was lymphedema, as well as the effect of WL as independent variable. All articles included are at higher level of evidence which is level one and two; as the well-designed RCT, longitudinal prospective design, large sample size, and multiple data collection methods. Adding to the strengths; the researchers used randomize sample, random assignment including intervention group and control group, well trained staff, and concealing. Furthermore; the ethical issues, human rights, IRB approval, and clearance report from the primary consultant, consent form, monitoring of extraneous factors, and long period of follow-up; gave studies a strong credibility to rely on.

**Evidence result:** During the last 8 years, research efforts have been developed to clarify the benefits of exercise and WL for cancer survivors. This development was going with the increased number of breast cancer survivors, their concerns, and needs. However; many patients continue to believe that it is not safe to lift any weight due to the risk of lymphedema.

Kwan and colleagues (2011) included six out of seven reviewed studies being RCTs, and one was a case-crossover study, aimed to study resistance exercise and its effects on BCRL. Overall, the studies support that resistance exercise is associated with minimal risk of development or exacerbation of lymphedema in the upper extremity. The authors of the systematic review; weight these evidences as “Likely to be Effective”. However; none of the
studies observed any significant increase in the development of BCRL with resistance exercise at various times post-operatively (1 months to 1 year), thus suggesting that slowly progressive resistance exercise is safe at any time interval following surgery. The PAL Trial (2010); summarized in this systematic review, had concluded that the onset of BCRL was not significantly different between the groups those with or without use of compression garments. The authors of the systematic reviews relayed on the two PAL studies (Schmitz, 2009; Speck, 2010) as the strongest evidence to support their conclusion that resistance exercise is likely to be effective in reducing the risk of BCRL and not exacerbating BCRL symptoms.

The other RCTs (Appendix-Table1) concluded that progressive WL was safe on women following breast cancer surgical treatments with lymph node dissection. Furthermore; WL did not significantly affect the severity of BCRL; reduced the number and severity of arm and hand symptoms; increased muscular strength; and reduced the incidence of lymphedema exacerbations. However; Kilbreath and colleagues (2012) found that both groups reported few impairments including swelling immediately following the intervention, and six months post intervention, but at the end they concluded that resistance training post-operatively did not precipitate lymphedema.

These results were unanimously supported WL for breast cancer survivors. Therefore; if patients keep not using their affected hand, this will lead to weak muscles of the affected arm, and increase the severity of arm symptoms.

**Weight lifting interventions:** The reviewed researches had long period of WL training ranges from one month to one year. However; the lowest weight acceptable to start training the affected arm is not well discussed in the latest researches, but one study had mentioned that training started gradually with half pound and increased gradually (Rehana et al., 2006).
Conclusion and Recommendations

There are enough evidences to justify that gradually progressive WL had no effect on the incidence or exacerbation of BCRL. Therefore; further changes into the current practice had to be implemented. Rational: to prevent developing lymphedema by breast cancer survivors; as not to exercise the hand may lead in the future, to weak limb with greater risk to develop BCRL.

The first intent of this study was to use the evidence based recommendations to guide the clinical practice. However; careful attention should be inconsideration to the individualize needs, situation, and disease process.

**Recommendations and implications:** One notable recommendation of the included studies; was that education of staff seems to have a positive impact on the optimal care for breast cancer patients, for example, in-service training that goes toward continuing education credit could be highly advisable toward decreased lymphedema incidence (kilbreath, 2006; Ahmed et al., 2006; Schmitz et al., 2009; 2010). So the current author recommends to:

1. **Clinical practice:** To set standards of care for the breast cancer patient who underwent surgical treatment with lymph node dissection starting preoperatively by measuring the circumferences of both arms, and followed the patient through their life.

2. **Weight lifting:** To develop a clear regimen for the weight lifting, to be accessible for the health care providers and breast cancer survivors.

3. **Education:** To enrich the oncology nurses knowledge, through formulating special courses about lymphedema, conducting a journal clubs, and to integrate this within the curriculum of nursing school.

4. **Research:** To conduct further researches clarifying the WL regimen and the use of compression garments.
References


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### Appendix (Table 1)

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<tr>
<th>Authors, year</th>
<th>Objective</th>
<th>Design</th>
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<th>Sample</th>
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<th>Data Collection Tools</th>
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<th>Level of Evidence</th>
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<tr>
<td>Hayes et al. (2011)</td>
<td>1. To compare baseline lymphedema prevalence in the physical activity and lymphedema (PAL) trial cohort 2. To compare the effect of the weight-lifting intervention on Lymphedema, according to four standard diagnostic methods.</td>
<td>RCT</td>
<td>University of Pennsylvania</td>
<td>Randomized sample of 295 female breast cancer survivors; Weight lifting group = 148 or control group = 147 group. Recruited between October 2005 and February 2007.</td>
<td>women’s lymphedema status Control group: no change in exercise level Studying group: twice-weekly supervised weight lifting for 13 weeks followed by twice-weekly (90 min) unsupervised exercise for 39</td>
<td>1. Inter limb volume difference through water displacement, 2. Inter limb size difference through sum of arm circumferences, 3. Inter limb impedance ratio using bioimpedance spectroscopy, 4. A validated self-report survey</td>
<td>Progressive weight lifting was shown to be safe for women following breast cancer, even for those at risk or with lymphedema, irrespective of the diagnostic criteria used.</td>
<td>II</td>
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<tr>
<td>Anderson et al. (2011)</td>
<td>To determine the effect of a moderate, tailored exercise program on health-related quality of life, physical function, and arm volume in women receiving treatment for non-metastatic breast cancer.</td>
<td>RCT, single-blind study</td>
<td>Wake Forest University School of Medicine</td>
<td>104 adult women 82 completed all 18 months.</td>
<td>Exercise group: 1. intervention began the RESTORE program with a Lymphedema Prevention Module (LPM) 2. Following the initial LPM, a 1-month follow-up to assess range of motion, strength, and weight resistance. 3. Each participant had elastic compression sleeve with instructions to wear it preventively during exercise, heavy arm use, and air travel. 4. Repeat visits at 3 month and 9 months.</td>
<td>1. Functional Assessment of Cancer Therapy–Breast Cancer (FACT-B), 3. Arm volume was performed at 3-month intervals through 18 months.</td>
<td>early exercise intervention after breast cancer diagnosis, a significant improvement was achieved in physical function, with no decline in health related quality of life or detrimental effect on arm volume.</td>
<td>II</td>
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<tr>
<td>Kilbreath et al. (2012)</td>
<td>To determine the effect of 4 – 6 weeks exercise program, post-operatively on reducing upper limb impairments in women treated for early breast</td>
<td>RCT</td>
<td>Three metropolitan hospitals in Sydney, Australia</td>
<td>Randomizes sample of 160 participants 81 exercise group, 79 control group</td>
<td>The exercise program comprised a weekly session and home program of passive stretching and progressive resistance training for shoulder muscles</td>
<td>1. Baseline, age, height, weight, and cancer treatment regimen. 2. Self-reported arm and breast symptoms 3. European Organization for Both groups reported few impairments including swelling immediately following the intervention and</td>
<td></td>
<td>II</td>
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<td>Kwan et al. (2011)</td>
<td>To extract the weight of the evidence and provide recommendations for exercise and lymphedema care in breast cancer survivors.</td>
<td>Systematic review</td>
<td>2004 to 2010</td>
<td>Key words: exercise and lymphedema</td>
<td>19 articles were selected for final review. Seven studies were identified addressing resistance exercise, seven studies on aerobic and resistance exercise, and five studies on other exercise modalities.</td>
<td>Not applicable</td>
<td>Retrieved from 11 major medical: PubMed-MEDLINE, CINAHL, Cochrane Library databases PapersFirst, ProceedingsFirst, Worldcat, PEDro, National Guidelines Clearing House, ACP Journal Club, and Dare</td>
<td>Strong evidence is now available on the safety of resistance exercise without an increase in risk of lymphedema for breast cancer patients.</td>
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### Appendix (Table 2)

<table>
<thead>
<tr>
<th>Authors /Year</th>
<th>The Rating System for the Hierarchy of Evidence (Melnyk &amp; Fineout-Overholt, 2005)</th>
<th>Level of evidence</th>
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<tr>
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<tr>
<td>Kwan et al. (2011)</td>
<td>Evidence from systematic review, meta analysis of all relevant randomized controlled trials (RCTs), or practice-guidelines based on systematic review of RCTs.</td>
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