Physical Exercise to Enhance Quality of Life among Adult Cancer Survivors: An Evidence-Based Review

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Abstract

Aims: The goal of this evidence based review was to assess the evidence of exercise effect on quality of life (QoL) in cancer survivors. Methods: Literature search were in: CINAHL, Science direct, Cochrane Central Register of Controlled Trials, PubMed, MEDLINE, EMBASE, and Google search engine. Keywords were: cancer (oncology, malignancy), exercise (sport, physical activity), survivors (living with cancer, curable). Only English language articles were accepted. All included studies were assessed for level of evidence.

Results: Nine articles were included: two systematic review, one meta analysis, one trial, one case report, and four cross-sectional. Results of included studies showed strong evidence that physical exercise can enhance QoL among cancer survivors. Conclusion: A program of moderate/ vigorous physical exercise for 30-60 minutes, 3-5 days per week; can be helpful to enhance QoL among breast and prostate cancer survivors, although there is an evidence that exercise are effective to enhance QoL in survivors of other types of cancer (Colorectal, Ovarian, Hodgkin's lymphoma, Lung, and Head and neck); but more studies are needed; to confirm this evidence.

Keywords: Cancer, Survivors, Exercise, Quality of Life
1. Introduction

Quality of Life (QoL) is the degree of human enjoyment with life activities (Medical Dictionary, 2012), related to cancer QoL defined as physical; social; functional; and emotional wellbeing of individual (Fallowfield, 2002). Cancer disease and related treatment usually affect quality of life among cancer patients (Caravati-Jouveneaux et al., 2011), however as a result of improving in the screening, diagnosis, and treatment; survival rate was improved dramatically (American Cancer Society, 2011), and in order to rehabilitate Cancer survivors to back again to their life wellbeing; QoL need to be enhanced. One of practices founded to have positive effects on QoL among cancer survivors is physical activities or exercise (Bélanger, Plotnikoff, Clark, & Courneya, 2011; Faul, Jim, Minton, Fishman, Tanvetyanon, & Jacobsen, 2011; Granger, McDonald, Berney, Chao, Denehy, 2011; Penttinen et al., 2011; Speed-Andrews, & Courneya, 2009). Adherence to physical activities and exercise usually decreased after treatment among cancer survivors (Pinto & Dunsiger, 2009).

There is a confusion in current evidence about the most appropriate types and features of exercise to enhance QoL among cancer survivors, even so; there is two major types of physical exercise: aerobic exercise and resistance-training exercise. Aerobic exercise is physical exercise that depends on the aerobic energy-generating process, and usually it is light to moderate activities (walking, cycle ergometer and / or motorized treadmill, weight training, slight movement, and multiple physical activities), While resistance-training exercise is to resist muscles contraction (Wikipedia, 2012), however; the both types of exercise (aerobic & resistance) may be applied by cancer survivors (Naumann et al., 2011), but there is a need to assess the current evidence about the most effective physical exercise approach to enhance QoL among cancer survivors.
Since there is no sufficient evidence about the most appropriate exercise program to enhance QoL among cancer survivors, then the purpose of this evidence based review is to assess the effect of physical exercise to enhance QoL among cancer survivors, and recommend the most effective exercise program to be applied by cancer survivors to enhance QoL.

1.1. Significance

Quality of life among cancer survivors worse over time (Bloom, Stewart, Oakley-Girvan, Banks, and Shema, 2011), lower physical activities lead to poor QoL and are associated with higher mortality rate among cancer survivors (Saquib et al., 2011), and poor QoL among cancer survivors associated with prolonged length of hospital stay (Laky, Janda, Chennakesavan, Cleghorn, & Obermair, 2010), prolonged length of hospital stay increase the treatment cost burden.

Low exercise level was reported among cancer survivors (Paxton et al., 2012; Szymlek-Gay, Richards, & Egan, 2011), however exercise was founded to be effective to enhance quality of life among cancer survivors (Beesley et al., 2011; Duijts, Faber, Oldenburg, van Beurden, & Aaronson, 2011; Rajotte, Baker, Gregerson, Leiserowitz, & Syrjala, 2012). This review will appreciate the evidence of exercise role to enhance QoL among cancer survivors, and describe the most appropriate exercise program to enhance QoL.

1.2. The PICO Summary and Questions:

P: The population of this review is adult patients whom are cancer survivors.

I: The intervention is physical exercise.

C: The comparison is between groups whom doing exercise versus whom not doing any type of physical exercises.

O: The desired outcome is to enhance quality of life for this population.

PICO Questions:

1) Is physical exercise enhance quality of life among cancer survivors?
2) What is the most effective exercise program to enhance QoL among cancer survivors?

2. Methods

Literature search for this evidence based review was carried out in CINAHL, Science direct, Cochrane Central Register of Controlled Trials, PubMed, MEDLINE, EMBASE, and Google search engine. Keywords used were: cancer, oncology, malignancy; terms related to exercise: sport or physical activity; terms related to survivors: living with cancer, curable; and Quality of life. Inclusion criteria were: (1) the subjects of the study is adult cancer survivors. (2) full text article. (3) published article. (4) include a measure of quality of life. (5) the article is in English. No restrictions for study design were applied.

All related articles were reviewed, selected articles were analyzed, and the following data were summarized for included studies: author and year, objectives, main outcome variables, design, setting, sample number, exercise, data collection instruments, and main results.

2.1. Quality Assessment

The level of evidence was assessed using a criteria summarized in appendix B (Hocking and Cousins, 2003). The level of evidence for included studies was summarized in the next section, however the level of evidence for the majority of included studies was moderate to high.

3. Results

3.1. Literature search

About 500 articles were results from the literature search, after title and abstract reviewing only 97 articles were selected for internal analyzes while the others were excluded because: its not measure QoL, not full text, or for pediatrics population, all duplicated articles which were included in systematic reviews or meta analyses were excluded to prevent
redundancy, the final articles used in this review were nine articles: three studies with strong level of evidence (level I): two systematic reviews (Bicego et al., 2008; McNeely et al., 2006), and one meta analysis (Ferrer, Medina, Johnson, Ryan, & Pescatello, 2011), one study with moderate level of evidence (level II): experimental trial (Mosher et al., 2009), four studies were with mild level (level III) which were a cohort studies (Blanchard et al., 2003; Chen et al., 2009; Smith et al., 2009; & Stevinson et al., 2007), and only one study was at low level (level V) which was a case report study (Hughes, Lenihan, Harrison, & Basen-Engquist, 2011), included studies are summarized in appendix A.

3.2. Exercise

Approximately all the two systematic reviews and the majority of the meta analysis included studies involved two groups: an exercise intervention group versus control group, while in the meta analysis; some studies applied within group intervention (Bicego et al., 2008; Ferrer et al., 2011; McNeely et al., 2009). In one study two cases applied physical exercise and observed by the authors (Hughes et al., 2011), and in another study participants ordered by phone to make exercise program, then their physical activity were assessed by another phone interview (Mosher et al., 2009). In contrast; four studies weren’t apply any intervention and exercise were assessed using self report questionnaires (Blanchard et al., 2003; Chen et al., 2009; Smith et al., 2009; Stevinson et al., 2007).

Different types of exercise (resistance-training, and aerobic exercise) were applied, with multiple features (walking, cycle ergometer and/or motorized treadmill, weight training, slight movement, and multiple physical activities). Only one study used aerobic exercises alone (Hughes et al., 2011), while the others used both types of exercise. The major features were: walking in some included studies of the systematic reviews (Bicego et al., 2008; McNeely et al., 2006), cycle ergometer and/or motorized treadmill in one study (Hughes et al., 2011), while the other six Studies included multiple activities (Bicego et al.,
The time and duration of exercise were different among studies, one study involved exercise for 30 minutes, three time per week for 16 weeks (Hughes, et. Al.,2011), some studies compare between exercise for short time and exercise for long time (Chen et al., 2009; Ferrer et al.,2011; Mosher et al., 2009; Smith et al.,2009; Stevinson et al.,2007) in the majority of included studies of two systematic reviews; exercise duration was started from 10 -20 minutes and progress to 30 - 60 minutes, with frequency arranged between two and five times per week, for average period of 12 weeks (Bicego et al.,2008; McNeely et al.,2006).

3.3. Quality of life

Different instruments were used to assess quality of life, Functional Assessment of Cancer Therapy (FACT) and its branches ( B: breast, G: general, H&N: head and neck, O: ovarian) was one of the most used instruments (Bicego et al.,2008; Ferrer et al.,2011; McNeely et al.,2006; Stevinson et al.,2007), the other most used instrument was Medical Outcomes Study short form 36 [SF-36] (Bicego et al.,2008; Ferrer et al.,2011; Hughes, et al.,2011; Mosher et al., 2009; Smith et al.,2009), some of the others instruments were: European Organization for Research and Treatment of Cancer Core Quality of Life Questionnaire C30 [EORTC QLQ-30] (Ferrer et al.,2011), Satisfaction with Life Domains Scale [SLDS-C] (Blanchard et al., 2003), World Health Organization’s Quality of Life Assessment Instrument (Chen et al., 2009), Cancer Rehabilitation Evaluation System Short Form (Bicego et al.,2008).

4. Discussion and conclusions

All included studies concluded that QoL was enhanced by exercise among adult cancer survivors, however greater minutes or amounts of exercise associated with more QoL (Blanchard et al., 2003; Mosher et al., 2009), and survivors who did few activities weren’t
enhanced their QoL (Stevinson et al., 2007), one meta analysis of 74 studies concluded that moderate intensity exercises as bicycling were associated with more QoL than low intensity exercises as walking (Ferrer et al., 2011), and one study concluded that QoL for patients who follow a guideline for exercise (30 - 60 minutes of moderate/ vigorous exercise, 5 days/ week) was better than who weren’t follow, and no differences in QoL were founded between who did exercises within guideline and who did it above guidelines (Stevinson et al., 2007), this highlights the need for appropriate exercise guidelines to enhance QoL and to avoid over or under needed exercises. Although the most appropriate duration and frequency of exercise still not clear, but based on the results of the majority of included studies; one of the best exercise program to enhance quality of life among adult cancer survivors; is a moderate/ vigorous exercise program for 30-60 minutes, 3-5 days per week.

The population of the included studies were Adult cancer survivors with different types of cancers, however; the populations of the majority of included articles in this review were adult breast, or prostate cancer survivors (Bicego et al., 2008; Chen et al., 2009; McNeely et al., 2006; Smith et al., 2009), in a meta analysis study the populations of the majority of included articles were breast and prostate cancer survivors (Ferrer et al., 2011), and in another study the majority of sample were breast cancer, and the rest were prostate and colorectal cancer survivors (Mosher et al., 2009) this can limit the representativeness of this review results to breast and prostate cancer survivors.

4.2. Conclusions

A program of moderate/ vigorous physical exercise for 30-60 minutes, 3-5 days per week; is helpful to enhance quality of life among breast and prostate cancer survivors, although there is an evidence that exercise are effective to enhance QoL in survivors of other types of cancer (Colorectal, Ovarian, Hodgkin's lymphoma, Lung, and Head and neck); but more studies are needed; to confirm this evidence.
4.3. **Recommendations**

4.3.1. *For Practice Nurses*

   a) Encourage cancer survivors to apply mild to moderate physical exercise for 30 - 60 minutes, three days per week.

   b) One of the recommended guidelines for effective exercise is Physical Activity Recommendations Of The American Cancer Society (Doyle et al., 2006)

4.3.2. *For Educators*

   Educators, and students need to know the role of exercise to enhance QoL among cancer survivors, more attention on these concepts can help to improve the nursing care process.

4.3.3. *For Researcher*

   More Randomized Control Trial (RCT) about the effect of exercise to enhance QoL among cancer survivors of different types are needed.
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Running head: EXERCISE TO ENHANCE QUALITY OF LIFE

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http://en.wikipedia.org/wiki/Exercise
## Summary Table Of Included Studies

### Appendix A

<table>
<thead>
<tr>
<th>Authors, year</th>
<th>Design</th>
<th>Setting</th>
<th>Sample</th>
<th>Exercise program</th>
<th>Quality of life</th>
<th>Main outcome</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hughes, et. Al.,2011</td>
<td>Case study</td>
<td>University of Texas M.D. Anderson Cancer Center</td>
<td>Two patients: Patient 1: Hodgkin's lymphoma. Patient 2: leukemia.</td>
<td>16-week, 30 min of exercise performed 3 times /week</td>
<td>SF-36</td>
<td>QoL was significantly improved for the two patients</td>
<td>V</td>
</tr>
<tr>
<td>Mosher et al (2009)</td>
<td>Experimental</td>
<td>Reach Out to Enhance Wellness (RENEW) Trial center.</td>
<td>753 older long-term breast, prostate, and colorectal cancer survivors.</td>
<td>Mean weekly minutes of moderate-to-vigorous exercise</td>
<td>SF-36</td>
<td>Greater exercise and better diet quality were associated with better physical quality-of-life outcomes ($P &lt; .05$).</td>
<td>II</td>
</tr>
<tr>
<td>Stevinson et al.,2007</td>
<td>Descriptive cross-sectional survey</td>
<td>Canadian provincial cancer registry.</td>
<td>1316 ovarian cancer survivors</td>
<td>No intervention Exercise measured by: the Leisure Score Index (LSI) of the Godin Leisure Time Exercise Questionnaire</td>
<td>FACT-Ovarian</td>
<td>Participants who meeting current physical exercise guidelines reported significantly enhanced QoL, than those who not meeting guidelines ($P &lt; 0.001$).</td>
<td>III</td>
</tr>
<tr>
<td>McNeely et al.,2006</td>
<td>Systematic review</td>
<td>Multi settings</td>
<td>14 studies of Breast cancer patients and survivors</td>
<td>Multi exercise interventions</td>
<td>FACT-general &amp; FACT-B</td>
<td>strong evidence that exercise positively influences QOL among breast cancer patients and survivors.</td>
<td>I</td>
</tr>
<tr>
<td>Bicego, et al. 2008</td>
<td>Systematic review/ for RCT studies</td>
<td>Multi settings</td>
<td>9 relevant RCT</td>
<td>Multi exercise interventions</td>
<td>7 instruments</td>
<td>strong evidence that exercise positively influences QOL in women living with breast cancer.</td>
<td>I</td>
</tr>
<tr>
<td>Blanchad, et al. 2003</td>
<td>Descriptive cross-sectional design</td>
<td>Outpatient clinics in four states (Iowa, Wisconsin, Minnesota, and Georgia)</td>
<td>352 adult cancer survivors.</td>
<td>No intervention Exercise behavior measured by questionnaire</td>
<td>Satisfaction with Life Domains Scale (SLDS-C)</td>
<td>Adult cancer survivors who currently exercised 3 times / week had significantly higher QOL than those who did not ($P&lt; 0.05$).</td>
<td>III</td>
</tr>
<tr>
<td>Smith, et al. 2009</td>
<td>Descriptive cross-sectional design</td>
<td>New Mexico, Western Washington, and Los Angeles.</td>
<td>730 breast cancer survivors.</td>
<td>No intervention, Exercise measured by: modified version of the Modifiable Activity Questionnaire.</td>
<td>SF-36</td>
<td>Meeting recommended levels of physical activity had significant positive associations with QOL ($P &lt; 0.05$).</td>
<td>III</td>
</tr>
<tr>
<td>Chen, et al. 2009</td>
<td>Observational cohort study</td>
<td>Shanghai, china</td>
<td>1,829 Chinese breast cancer survivors.</td>
<td>No intervention Exercise measured by Yes/ No questions if yes report 5 of exercises.</td>
<td>The General Quality of Life Inventory-74.</td>
<td>Regular exercise was associated with quality of life ($ p &lt; 0.05$)</td>
<td>III</td>
</tr>
<tr>
<td>Ferrer et al.,2011</td>
<td>Meta-analysis</td>
<td>Multi settings studies</td>
<td>74 articles, populations: survivors from different types of cancer.</td>
<td>Multi exercise interventions</td>
<td>The most used: EORTC QLQ-30, SF-36, FACT-G, and FACT-B.</td>
<td>exercise interventions enhance QOL, but this depended to some on exercise and patient features.</td>
<td>I</td>
</tr>
</tbody>
</table>
### Appendix B

Assessment of evidence level criteria

<table>
<thead>
<tr>
<th>Level</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Systematic review or meta-analysis</td>
</tr>
<tr>
<td>II</td>
<td>Randomized double-blind controlled trials of sufficient size and consistency</td>
</tr>
<tr>
<td>III</td>
<td>Randomized clinical trial of moderate quality or insufficient size or other comparative trials (non-randomized, cohort studies, crossover studies)</td>
</tr>
<tr>
<td>IV</td>
<td>Non-comparative trial, observational study, case series, comparative trial with one patient (N of 1 trial)</td>
</tr>
<tr>
<td>V</td>
<td>Case report</td>
</tr>
</tbody>
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