

## RESEARCH ARTICLE

# Physical Activity and Quality of Life of Cancer Survivors: A Lack of Focus for Lifestyle Redesign

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### Abstract

**Background:** Physical activity is a component of lifestyle activity and one that has been increasingly seen as ‘the medicine’ to cure chronic diseases, including certain types of cancer. Physical activity has potent impact on mortality but only if it is well incorporated as lifestyle activity may it allow a better outcome of the quality of life of cancer survivors. This paper presents a review on the evidence of physical activity being actively promoted as lifestyle activity amongst cancer survivors, for the last five years. **Materials and Methods:** Electronic databases were systematically searched for randomized controlled trials incorporated as lifestyle activity through MEDLINE with the associated terms “physical activity or exercise”, “quality of life” and “cancer survivor or people with cancer”, ‘lifestyle’ and ‘randomised controlled trial’. The period of search was confined to publication within January 2008 till December 2012 and further limits were to full text, peer reviewed, abstract available and English language. **Results:** Based on inclusion criteria, 45 articles were retrieved. Of these, 41 were excluded after examining the full paper. Four final articles on randomized controlled trials were studied to determine the effectiveness of PA to improve the quality of life in post treatment cancer survivors and positive associations were found. **Conclusions:** Physical activity is related to better quality of life of cancer survivors. Only one paper had characteristics of lifestyle incorporation for a lifestyle redesign, but none overtly or actively promoting exercise interventions as an essential lifestyle activity. With increasing survivorship, the benefits of physical activity must be aggressively and overtly promoted to optimize its positive impact.

**Keywords:** Physical activity or exercise - quality of life - cancer survivors - randomized controlled trials

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### Introduction

The World Cancer Research reaffirmed recently that there is overwhelming strong evidence that our cancer risk is affected by our lifestyles (AIRC, 2013). Lifestyle is a major factor that may counteracts health problems related to cancers. The key causes of cancer are deeply associated with lifestyles activities, such as physical inactivity, overweight, tobacco, alcohol, occupational hazard and diets including lack of fruits and vegetables, meat, and lack of fibre, hormonal changes or menopausal effect, and including sunlight exposure. Research evidence on physical activity as having significant protecting effect against cancer is growing. In 2010, Cancer Research UK estimated that cancer is linked to physical inactivity with an evidence through the study by Parkin (2011), physical activity among women is lower than men in the UK, therefore this reflecting the level of women (at 2%) contributing to cancer were higher than men (less than 0.5).

Protective associations between PA and some key common cancer were supported by the results from both case-control and cohort studies. The underlying mechanism for this positive protective role was attributed to various pathways, including via, failing fecal transit time, inflammation and insulin resistance and changes in hormone metabolism (World Cancer Research Fund and American Institute for Cancer Research, 2007). A systematic review (n=50 studies) on its association between PA and breast cancer, revealed a 15-20 percent lowered risk for active women (Monninkhof, 2007). The underlying mechanism may be due to the altered hormone levels to reduce the risk of cancer (McTiernan, 2004; Chan, 2007). Another meta-analysis of prospective studies by Moore et al. (2010), reported about 20-30% reduced risk of endometrial cancer in active women compared to the least active, via the possible mechanism of a reduction on the levels of serum oestrogen and circulating insulin. Therefore, there is a potential risk reduction of between 15-30 percent in these types of cancer. In additions, a

meta-analysis by Tardon et al. (2005) found evidence those individuals who have high levels of recreational physical activity participation have a lower risk of lung cancer.

With dosage-risk associations, individuals who are contributing less than 150 minutes (48 hours and 30 minutes) of PA per week is at risk of breast cancers (more than 3%), colon cancers (more than 3%), and endometrial cancers (around 4%) (Parkin, 2010). A recent study in Lancet (2012), adds evidence to these estimates with its report that physical inactivity in UK attributed to a further increase risks of about 18 percent breast cancers and 19 percent of colon cancers. Nevertheless, some studies have shown a risk reduction (Hanley et al., 2001; Michaud et al., 2001), yet other studies does not even show an association (Patel et al., 2005; Lin et al., 2007). For example, a recent meta-analysis showed leisure time physical activity (LTPA) has no association on risk of pancreatic cancer (Bao and Michaud, 2008), highlighting that the type of cancer is an influential factor. Therefore, the gap in research in this aspect of physical activity although suggest strong role of risk reduction but there are moderators and mediators that needs to be identified too.

Within the expanding field of cancer survivorship, the evidence that lifestyle intervention can help and the emphasis into these lifestyle studies are still lacking. Therefore, this paper present a review on the evidence of LA promotion amongst cancer survivors –i.e. physical activity that are incorporated as lifestyle intervention on the increasing number of cancer survivors for the last five years.

## Materials and Methods

### Search strategy

The relevant literature was identified by MEDLINE search of computerised database, citations in identified full text, abstract available and contributions from peer reviewers. The MEDLINE database was searched using the keywords “physical activity”, “quality of life” and “cancer survivor”. The periods of publication was confined to January 2008 till December 2012, whilst language used was limited to English.

Only randomized controlled trials (RCTs) evaluating the effectiveness of interventions of PA for enhancing QOL in cancer survivors were included. A second inclusion criterion was that all studies should observe participants for a post-treatment status, yet no recurrent diagnosis is accepted. For the PA to have effective, lasting impact on QOL in cancer survivors, it must have features of regular routine in their lifestyles.. This study examines PA as lifestyle activity, in post-treatment cancer survivors and its cumulative outcome on QOL.

Thus, the following criteria were included: (1) participants with a cancer diagnosis of any type, level, severity of cancer at any time throughout the study period; (2) the participants is a post treatment subject (not recurrent cancer survivor); (3) assessment of participation in physical activity (PA) and the outcome of QOL. (4) RCT within the last 5 years. (6) Language is restricted, and only English studies are eligible.

Physical activity (PA) refers to the movement of the body and occurs in response to skeletal muscle contraction simultaneously with the increased of energy expenditure. PA is the fundamental range of daily occupations such as feeding, typing on a keyboard, ambulating to housekeeping activities to structured exercise routines. (Whaley et al., 2006). “An individual is considered a cancer survivor from the time of diagnosis, through the balance of his or her life, and this definition includes the family members, friends, and caregivers who are also impacted by the survivorship experience.” by the National Cancer Institute (2013).

World Health Organization (1997) had defined “Quality of Life” as individuals’ perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person’s physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of their environment. Additionally, a definition of QOL is “a state of well-being that it is a composite of two components - i) the ability to perform everyday activities that reflect physical, psychological, and social well-being; ii) patient satisfaction of the levels of functioning and the control of diseases or its treatment-related symptoms” (Gotay et al., 1992).

### Quality assessment

Descriptive characteristics of each study were extracted including the study design, participant characteristics, and recruitment details. In additions, physical activity (PA) including the characteristics or programs of PA, length and frequency contribute in PA, the duration and intensity; and adherence or compliance with the redesigned PA. More importantly, the method on results recent evaluation should include results of evaluating the effects of the PA as LA on health outcomes was extracted.

## Results

### Literature search results

Forty-five papers were identified as meeting the inclusion criteria. On close examination of full paper, forty-one were later excluded for the following reasons: the study design is not randomized controlled trial (n=33), outcome assessed was not on interest of QOL (n=4), the study participants were not post-treatment survivors (n=1).

Almost all of these exercise intervention studies have not made a conscious effort to actively designed physical activity program as a part of lifestyle-activity. Although, one study did mentioned about promoting exercise as a regular daily activity to cancer survivors so as to effectively improve QOL.

Quality of life (QOL) is identified for all the paper as an outcome measure, but there is no standard definition of it. QOL is broadly an individuals’ perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns (WHO, 1997). Of the 45 studies included which were investigating the quality of life as outcome from exercise engagement, none of the

Table 1. Physical Activities and the QOL on Cancer Survivors Post Treatment (PostRx) (2008- 2012)

Authors (Year)	Population	Method of measure/frequency	Results	Comments/Conclusion
Cadmus et al. (2009) Impact study	<b>Breast cancer survivors (BCS):</b> Newly diagnosed women(n=50) Post treatment women (n=75)	6 months measures: <b>New diagnosed (Total n=50):</b> =Intervention group (n=25) =Home based exercise group/usual care (n=25) <b>Post treatment: (Total n= 75):</b> =Intervention group (n=37) =Home based exercise/usual care (n=38)	<b>Completed trials:</b> New: n=45/50 Post treatment: n= 67/75	The study reported that exercise did not improve QOL for both groups, However, there were significant improvement in social functioning in intervention group. 96% reported at least twice per week will exercise at home. No overt promotion of exercise as lifestyle activity but characteristic were reflective of lifestyle incorporation
Maryam et al. (2010)	Breast cancer survivor (n=56) Experimental group (n=28) Control group (n=28) *each study period was for 9 weeks	QOL-BC questionnaire (pre & post interventions)	<b>Pre-intervention:</b> No significant differences were found in QOL between groups <b>Post-intervention:</b> Significant change in QOL in intervention group (p=0.003) -indicative of effectiveness of exercise on QOL status.	Programme designed improved QOL. Breast cancer survivor can regularly take part in PA, but characteristic of the design is in line with effort to make it a lifestyle activity.
Sherman et al. (2010)	Breast cancer survivor (n=162) <b>Intervention group:</b> Had baseline assessment ( n=116) Had follow-up assessment(n=87) <b>Control group:</b> Had baseline assessment(n=46) Had follow-up assessment(n=87)	<b>8 weeks for either:</b> 1. intervention 2. control	Mean +SD: <b>FACIT-B physical well-being finding:</b> Intervention:(23.97 + 2.79) Control: (22.83 +2.82)	For Intervention group a further significant increases in functional ability and energy levels.
Lee et al. (2010)	Breast cancer survivor (total n=32)	<b>8 weeks (40 min/week):</b> Scapula-oriented exercise (n=16) General exercise (n=16)	European Organization for Research and Treatment of Cancer (EORTC-C30)	The study found global QOL was significantly greater in the scapula-oriented exercise group than in the general exercise group. This 'Upper-limb' focused study has no effort in examining exercise as a lifestyle activity.

paper clarified what is quality of life.

In Cadmus et al. (2009)'s paper, the effect of exercise on QOL were studied on post-treatment survivors and on newly-diagnosed survivors. The study outcomes was reported form two very similar RCTs, the Increasing or Maintaining Physical Activity during Cancer Treatment (IMPACT) Study and the Yale Exercise and Survivorship (YES). The intervention was home-based exercise or usual care for 6 months period. In this study, QOL measured were specifically related to happiness, depressive symptoms, anxiety, stress and self-esteem. Exercise was associated with improved social functioning among post-treatment cancer survivors who reported lower social functioning. Although there was no conscious attempt to design the exercise as a lifestyle activity, the study does seem to lean towards lifestyle because it was- i) home-base type of exercise, and ii) over a long duration of 6 months; and these features are consistent with lifestyle activities adoption.

In Maryam (2010)'s study on exercise over 9 weeks duration (ie. over the period of three cycle of chemotherapy), the breast cancer survivors select three to five days per week, preferably at some specific hours (9-10 a.m.), to perform the designed exercise at home. This is characteristic of an effort to make it a lifestyle physical activity. The exercise programme included (1) warm up stage (4-min of jogging and 6-min of stretching), (2) main training stage (upper and lower extremities and trunk exercises- 5-min for first stage of the study, 10-min in the sixth week and 15-min in the ninth week) and (3) cooling down (5-min relaxation techniques). On the contrary, within the control group, only QOL was measured before and after the intervention, using the Quality of Life-Breast Cancer (QOL-BC) questionnaire which covers physical, emotional and social dimensions. In reports, measure was done before the intervention with results indicative of the equality of the level of QOL in both groups. After intervention in 9 weeks, the experiment group has significantly improve in all physical, psychological and social dimensions of QOL as well as total QOL compare to the control group. Although the authors seem to place activity as part of lifestyle, there were no overt attempts to promote it as one.

In Sherman (2009)'s study – the Encore intervention (combined low intensity floor-based mobility and stretching exercises over 20 minutes), was compared to a slow-progressive hydrotherapy resistance exercises over 30 minutes, over eight weeks (2 hours

per week). The study found that the Encore program significantly increased the functional ability and energy level contributing to better QOL. This study was a centre-based program for only 8 weeks, therefore, it does not have the characteristic feature of a lifestyle program apart from the fact that there was clearly no effort from the researchers to promote it as a lifestyle activity.

In Lee et al (2010)'s paper, a 8-week scapula-oriented exercise was conducted once (40 minutes) a week. The study aims to examine the effects of scapula-oriented exercise on the upper limb dysfunction in breast cancer survivors, with resulting negative effect on QOL. QOL was measured using the European Organization for Research and Treatment of Cancer (EORTC-C30) on 32 women randomly assigned to exercise group whilst usual care had general exercise or body conditioning exercise. The study found global QOL was significantly greater in the scapula-oriented exercise group than in the general exercise group. This study looks at a highly compartmentalised, specific component performance limitation of the upper limb and thus, was clearly not about adopting activity as a lifestyle nature.

In conclusion, the four studies showed that adherence of PA were significantly associated with better QOL in cancer survivors. However, none of the studies made explicit effort to promote PA as a lifestyle activity whilst only one manifested features of lifestyle activity. Exercise has to be essentially incorporated into daily living tasks to ensure sustainability and its follow-through impact. More studies are warranted to examine this gap of research study, extend or elaborate to cover on the much needed, important aspect of incorporating PA as lifestyle activities.

In diagnosis, studies included in this review for cancer control had determined a strong association between physical activity and quality of life (QOL) on the various types of cancer survivors. particularly breast, cervical and colorectal. Three studies examined participants with breast cancer, one examined with cervical cancer, one examined with colorectal cancer, two examined with ovarian cancer, one examined with lung cancer, and one examined with childhood cancer (lymphoma, leukemia, CNS).

## Discussion

With over 100 years of research, a cure has not been found for most cancer but the research evidence are mounting that PA plays a significant role in reducing the risk of cancer and cancer recurrences. Physical activity (PA) is an effective intervention to improve quality of life (QOL), cardiorespiratory fitness, physical functioning, and fatigue in breast cancer patients and survivors (Markes et al., 2006; Mcneely et al., 2006; Jeffrey et al., 2008). Physical activity (PA) has been one lifestyle activity (LA) acknowledged to have excellent potential for enhancing the aversive side effects of treatment and positively influencing disease-related outcomes (Holmes, 2005; McNeely, 2006; Holick, 2008; White, 2009). PA as an activity per se has strong evidence of cancer control, but to increase its effectiveness, all form of physical activity need to be adopted as a essential part of daily activities. Although, one study (Cadmus et al., 2009)

reported no improvement on QOL during the six months PA participations, the general consensus from the other studies showed that- i) a strong body of evidence exists for the functional and quality of life benefits from PA even though participation rates have consistently been reported as low level; ii) a clear evidence that sedentary lifestyle is negatively associated with survival, even though the direct mechanism of PA on cancer survival is still unclear. Overall, current studies should move into a more overt focus on how to optimize PA as a lifestyle activity, and identification of influential factors like preferences, competence, cultural inclinations and adherence of the target population should be designed to ensure better physical activity uptakes in an increasingly sedentary lifestyle.

In limitations, this is a systematic review to determine the PA as lifestyle activity to effectively enhance the QOL on cancer survivors. However, there are several limitations. Although the researchers have attempted to perform more extensive literature-search, some studies are not accessible via the keyword searches for inclusion. There was no direct physical activity as the essential lifestyle activity incorporated as activities of daily living. Thus, a primary limitation was that most studies highlighted PA as exercise or physical activity to improve QOL, but none had explicitly links it as a lifestyle physical activity. In addition, we limit our search to RCT, whereby, bias can occur because of conflict between observed results within "controlled" experiment settings, versus in "real" life, and short-term focus may missed the long-term benefits/side-effects (Terris, 2006). In addition, we also did not limit the type of cancer, but we recognized that PA has more impact on certain cancer because of the mechanisms of pathway on how it can drastically influence survivals in breast and colorectal cancer, compared to other types of cancers.

In conclusion, physical activity is a potent 'medicine' for improving the quality of life of cancer survivors, by increasing physical fitness, fatigueless, mental health, muscular strength, endurance and reduced pain and other after-effects experienced by the various types of cancer survivors. Regular physical activity as part of lifestyle can ensure better improvements. Many studies have merely examined physical activity as an intervention to improve some symptoms experienced for an eventual impact on Quality of life. This study found an increasing preference to study physical activities (PA) as a high quality treatment for post-treatment cancer survivors to optimize their QOL. However the idea that it should be regular-daily physical activity should be followed up and ways to ensure how it can be better integrated into lifestyles is warranted. There are far too few studies that examine physical activity as a component to be integrated into the cancer survivors' daily living activities or, of physical activity as an overt lifestyle activity. Unless more research focus on how to gather evidence of physical activity as lifestyle activity, efforts by health professionals such as occupational therapist to reexamine lifestyle redesign of some cancer survivors to reduce mortality and morbidity from cancer will be hampered. With increasing rates of survivors, more studies to address this gap would be timely, if not proactive for the world's 28 million cancer survivors.

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