

## The Effect of Physical Exercise on Quality of Life of Breast Cancer Survivors: A Systematic Review

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### ABSTRACT

**Background:** Exercise generally improves the quality of life (QoL) in adult populations especially for patients with chronic health problems such as breast cancer. The purpose of this study was to investigate the effect of physical exercise/activity on the quality of life of breast cancer survivors.

**Subjects and Method:** This was a systematic review study that used articles from online databases, such as PubMed, Science Direct, ProQuest dan Medline, which was published from 2000 to 2021. The author used keywords of “physical exercise”, “physical activity”, “quality of life”, “breast cancer survivor”. The dependent variable was quality of life. The independent variable was physical exercise/ activity. As many as 5 articles were selected for this study from 837 articles located in South Korea, Iran, Malaysia, and China.

**Results:** Moderate or high levels of physical activity had positive relationship on the quality of life related to overall physical health among breast cancer survivors.

**Conclusion:** Moderate to high physical activity improve the quality of life among breast cancer survivors.

**Keywords:** physical exercise, physical activity, quality of life, breast cancer survivor

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### BACKGROUND

Breast cancer is the most common cancer among women both in developed and developing countries (World Health Organization, 2017). Women with a history of breast cancer are the largest group of female cancer survivors and account for about 41% of the total (NCI Office of Cancer Survivorship). Due to advances in early detection and treatment, there has been a growth in the number

of cancer survivors, necessitating research to identify modifiable risk factors to prevent cancer recurrence and all-cause mortality in survivors of breast cancer (American Cancer Society, 2016).

A cancer survivor is defined as anyone who has been diagnosed with cancer, from the time of diagnosis through the rest of their life (CDC, 2011). Breast cancer is not only a serious threat to women's health but also has

long-term effects on health-related quality of life (HRQoL) after treatment (Ganz et al., 1998; Shockney, 2010). Cancer survivors who have successfully completed their primary cancer treatment often expect to resume their work or daily life at a level similar to that before the cancer diagnosis. While cancer treatment has been shown to be effective in prolonging survival, it can be intensive and can lead to increased fatigue, decreased physical activity, and a reduction in quality of life (Rolke et al., 2010; Muraca et al., 2011; Servaes et al., 2002).

Many cancer survivors are highly motivated to seek information about food choices, physical activity, dietary supplement use, and complementary nutritional therapies to improve their response to treatment, speed recovery, reduce their risk of recurrence, and improve their quality of life (Jones and Demark-Wahnefried, 2006). Among patients with chronic health problems such as cancer, physical activity may be especially important as a means of reversing illness-related declines in physical endurance, increasing capacity for engaging in activities of daily living, improving emotional well-being, enhancing regulation of physiological systems, and prolonging survival (Courneya, 2003; Holmes et al., 2005).

Prospective, observational studies have demonstrated that physical activity after a cancer diagnosis is associated with a reduced risk of cancer recurrence and improved overall mortality among multiple cancer survivor groups, including breast, colorectal, prostate, and ovarian cancer. Among breast cancer survivors, physical activity after diagnosis has consistently been associated with reduced risk of breast cancer recurrence and breast cancer-specific mortality. A recent meta-analysis demonstrated that postdiagnosis exercise was associated with a 34% lower risk of breast cancer deaths, a 41% lower risk of all-cause mortality, and a 24% lower risk of

breast cancer recurrence (Haydon et al., 2006; Ibrahim and Al-Homaidh, 2011; Kenfield et al., 2011; Meyerhardt (a) et al., 2009; Meyerhardt (b) et al., 2006; Meyerhardt, et al., 2006; Moorman et al., 2011).

Among breast cancer survivors, the data are less definitive. A recent review reported that higher physical activity was associated with improved survival in four studies while no association was found in three studies, leading to an equivocal conclusion (Barbaric et al., 2010). Physical activity has been consistently found to be a crucial element in the therapy of various chronic diseases as it has been proven to improve HRQoL and reduce mortality (Mason et al., 2013).

On the contrary, physical inactivity and sedentary behavior are associated with poorer health consequences among breast cancer survivors and they were also a barrier towards the improvement of HRQoL (George et al., 2014). A recent roundtable by the American College of Sports Medicine concluded that exercise is safe during and after cancer treatment and results in improvements in HRQoL (Schmitz et al., 2010). Survivors face many physical and emotional challenges throughout their treatment and recovery, including persistent and profound adverse effects on physical and mental quality of life (Hewitt et al., 2003).

Little is known about the relationship between physical activity and HRQoL among survivors. Because active or sedentary behavior can be feasibly modified in adults (Gardiner et al., 2011), there is a need for more research in this area to inform behavioral interventions for survivors. Therefore, this study aims to investigate the effect of physical exercise on the quality of life of breast cancer survivors.

## SUBJECTS AND METHOD

### 1. Study Design

This study was a systematic review of article published 2000-2021 conducted from 01 November until 30 December 2021. We search articles using the online databases of PubMed, Science Direct, ProQuest and Medline. The articles used in this review are articles published from 2000 to 2021. In the process of searching for articles, researchers used the keywords “physical exercise”, “physical activity”, “quality of life”, and “breast cancer survivor”.

### 2. Inclusion and Exclusion Criteria

The inclusion criteria of this study were: 1) an article describing the effect or relationship of physical exercise on the quality of life of breast cancer survivors; 2) original research papers; 3) research subjects are breast cancer survivors who have completed basic treatments such as chemotherapy, radiotherapy, mastectomy or breast-conserving surgery; 4) the quality of life variable was obtained using

a questionnaire European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core30 (EORTC QLQ-C30) or European Organization for Research and Treatment of Cancer QoL Questionnaire–breast cancer-specific module EORTC QLQ-BR23).

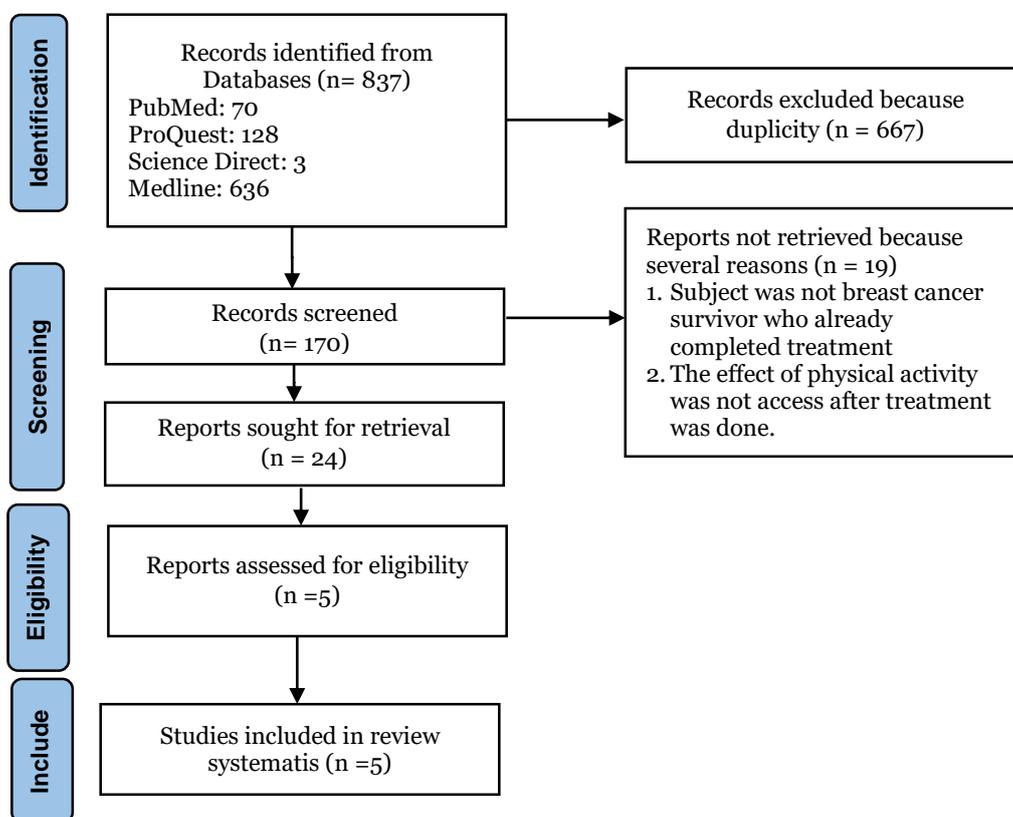
The exclusion criteria for this study were: 1) articles in languages other than English and Indonesian; 2) review papers.

### 3. Study Variables

The dependent variable was quality of life. The independent variable was physical exercise/ activity.

### 4. Operational Definition

**Quality of life** defined by scoring answers from a questionnaire about quality of life, **Physical exercise** was assessed by categorizing the duration and frequency of the survivors doing physical exercise such as standing, walking, and other physical activities in days and/or weeks.



**Figure 1. PRISMA Diagram**

**Table 1. Characteristics of the included study**

Author	Study Design	Country	Instrument	Population	Intervention	Control	Outcome
Ahn et al. (2020)	Cohort	Korea	The 5-dimensional questionnaire by EuroQoL group (EQ-5D) and EORTC QLQ-BR23. Global physical activity questionnaire (GPAQ) of the World Health Organization (WHO).	Breast cancer survivor	Active in physical activity	Low or inactive on physical activity	Mobility and anxiety and systemic therapy side effects and future perspectives were better in physically active groups for the survivors with breast-conserving surgery.
Gong et al., (2017)	Cross-sectionals	China	EORTC QLQ-C30.	Breast cancer survivor	Exercisers	Non-exercisers	Mean difference Global Health/ QOL= 4.00 (2.08, 5.92)
Mohammadi et al., (2013)	Cross-sectionals	Iran	EORTC QLQ-C30/+BR-23. Physical activity was assessed by International Physical Activity Questionnaire (IPAQ).	Breast cancer survivor	Moderate or vigorous on physical activity	Low on physical activity	Correlation between Physical Activity with Quality of Life among Breast Cancer Survivors (r= 0.01; p= 0.887)
Shin et al. (2017)	Cross-sectionals	Korea	EORTC QLQ-C30/+BR-23.	Breast cancer survivor	Moderate or vigorous on physical activity	Low on physical activity	Global health status / QoL (b=40.10 (29.17, 55.12)).
Nurnazahiah et al. (2020)	Cross-sectionals	Malaysia	EORTC QLQ-C30. The ActivPAL3™ microdevice (PAL Technologies Ltd., Glasgow, UK).	Breast cancer survivor	Moderate or vigorous on physical activity	Low on physical activity	Global health status / QoL (b=0.218 (0.011, 0.425)).

## 5. Research Instrument

We got total 837 of articles from searching through online databases (PubMed, Science Direct, ProQuest and Medline). The process of searching and filtering articles using a Prism diagram (figure 1). Articles included in this study must meet the inclusion criteria and have been reviewed using a critical appraisal in accordance with the research design of the article used. A total of 5 articles were included for this study.

## RESULTS

### 1. The measurement of physical activity

Not all studies included in this systematic review categorized participants based on the level of physical activity (moderate to vigorous). Two out of the five studies (Mohammadi et al., (2013) and Shin et al. (2017) categorized the level of physical activity based on metabolic equivalent tasks (METs) or kilocalories (kcal) per unit of frequency and duration, such as MET-hours per week. The MET is the ratio of metabolic rate during the activity as compared with the metabolic rate during rest. For each type of activity, the weighted MET minute per week is calculated as follows (IPAQ, 2005): 1) Walking MET-minute/week =  $3.3 \times \text{walking minutes} \times \text{walking days}$ . 2) Moderate MET minute/ week =  $4.0 \times \text{moderate-intensity activity minutes} \times \text{moderate activity days}$ . 3) Vigorous MET-minute/ week =  $8.0 \times \text{vigorous-intensity activity minutes} \times \text{vigorous activity days}$ . The total physical activity MET-minute/ week value was then computed by summing the walking, moderate and vigorous MET minute/ week scores. The scores Impact of Healthy Eating Practices and Physical Activity on Quality of Life among Breast Cancer Survivors were then categorized into low, moderate, and vigorous physical activity levels according to the IPAQ categorical classification (IPAQ, 2005).

One study by Gong et al. (2017) categorized participants by type into two categories, which is exerciser and non-exercisers. The category was obtained using the question “Do you engage in moderate-intensity physical activity (such as running, vigorous walking, badminton, table tennis, tai chi, etc.) at least 30 min for one time every week in the past month?” and “If you do, how many times do you engage in it every week?”. If the answer to the first question is “Yes”, then participants were defined as exercisers. Otherwise, participants were defined as non-exercisers.

A study by Shin et al. (2017) assessed physical activity after breast cancer diagnosis was using a detailed questionnaire. We asked participants about the type, duration, and frequency of each physical activity. As additional questions, participants were asked to list up to three types of exercise that they commonly engaged in as well as their duration and frequency, then a metabolic equivalent value was assigned to each activity reported according to the Compendium of Physical Activities.

Studi by Nurnazahiah et al. (2020) calculates the time spent on sedentary behavior and moderate to vigorous physical activity (MVPA) during the waking hours were measured using the ActivPAL3™ microdevice (PAL Technologies Ltd., Glasgow, UK).

### 2. The Effect of Physical Activity on HRQoL among Breast Cancer Survivors

All the five articles included in this systematic review used a questionnaire measuring global HRQoL and four different dimensions of HRQoL (i.e., physical, social, emotional, and functional well-being), with a conclusion such as these: Study by Ahn et al. (2020) found that mobility and anxiety and systemic therapy side effect and future perspective were better in physically active groups for the survivors with breast-conserving surgery.

Gong et al. (2017) said that physical exercise is positively associated with HRQoL of breast cancer survivors. Mohammadi et al. (2013) stated that breast cancer survivors with a higher level of physical activity had better emotional and cognitive functions. Physical activity can improve the quality of life of cancer survivors. The study by Shin et al. (2017) said that engagement in physical activity was related to better health-related quality of life among breast cancer survivors. Nurnazahiah et al. (2020) stated that an increase in the time spent on MVPA was associated with improved HRQoL while sedentary behavior was associated with poorer HRQoL among breast cancer survivors.

## DISCUSSION

The results of this study indicated a positive association between moderate or high levels of physical activity with quality of life that emphasizes overall health among breast cancer survivors.

The study by Schmitz et al., (2005) also stated that physical activity improves cardio-respiratory fitness during and after cancer treatment, symptoms and physiologic effects during treatment, and vigor after treatment. A study by Mosher et al., (2009) also found the association between physical activity or exercise with improved physical functioning among older breast and prostate cancer patients within 18 months of diagnosis. Examination of associations between exercise habits and QoL outcomes revealed that weekly minutes of moderate-to-vigorous exercise was associated with better physical QoL, including less pain and role limitations due to physical problems and better health perceptions, physical functioning, and vitality Older, Long-term Breast, Prostate, and Colorectal Cancer Survivors (Demark-Wahnefried et al., 2004). It was also reported in a meta-analysis study that physical activity has

positive effects on physiology, body composition, physical functions, psycho-logical outcomes and also quality of life in patients following breast cancer treatment (Fong et al., 2012). These results were supported by others studies (Daley et al., 2007; Ogunleye and Holmes, 2009) which indicated physical activity improved quality of life after breast cancer.

There is evidence that exercise after breast cancer treatment can improve aerobic fitness, strength, flexibility, physical function, shoulder function, QOL, and symptoms, and side effects, while also reducing fatigue and pain, However, physiologic impairments and altered risks for cardiopulmonary, bone health, neurosensory and other outcomes among breast cancer survivors can confuse the safety of returning to exercise after treatment.

Therefore appropriate allowance for recovery from surgery, as well as recovery of hematologic and immunologic parameters altered by chemotherapy and radiation, should guide the timing of exercise testing after treatment. The specific amount of time allowed for recovery after a patient's treatment is completed will vary between survivors according to a given woman's prediagnosis fitness and health status, and should be guided by symptom response and medical parameters; for example, no exercise testing or exercise sessions should occur during fever, ataxia or extreme fatigue. Low physical functional status may or may not be a contraindication for testing, but will alter the choice of testing modality and the appropriate level of medical supervision. If a woman develops an irregular increase in pulse or respiratory rates with minimal exertion, sharp pain in her bones or joints, disorientation, confusion, dizziness, lightheadedness, blurred vision, or fainting during exercise, she should stop exercising immediately (Schmitz and Speck, 2010).

Each breast cancer survivor will have her own goals that she wants to achieve from an exercise program. Common goals will probably include regaining and improving physical function, aerobic capacity, strength, and flexibility, to improve body image, body composition, physical fitness and to reduce the risk of recurrence. There are published guidelines for the mode, frequency, intensity, and duration of exercise recommended for improving and maintaining health (US Department of Health and Human Services, 2008).

Studies that discuss the relationship between physical exercise and quality of life among breast cancer survivors, which emphasize the quality of overall health are still rare. The other review study also investigates the association between physical activity with quality of life, but does not consist of specifications about the overall health quality and does not specify the use of the EORTC QLQ-C30/+BR-23 questionnaire to assess the quality of life among breast cancer survivors.

There are several limitations in this review. First, this study was limited to only English language articles, and also the researchers were not aware of any unpublished articles that fulfilled this study's criteria. Third, still there is a limited number of studies on the effect of physical exercise /activity on the quality of life of breast cancer survivors so further study is needed for more evidence. In conclusion, moderate to high physical activity can improve HRQoL among breast cancer survivors. So it was necessary for health provider to further promote about the importance of suitable physical activity among breast cancer survivors.

#### **AUTHOR CONTRIBUTION**

Arief Wahyudi Jadmiko as the main researcher contribute of the searched, screened and reviewed of the article. Tri Nur Kristina, Untung Sujianto, Yan Wisnu Prajoko, Luky Dwiantoro, Aris Puji Widodo as the next

researcher contribute of the searched of the article and was aranging the manuscript of this article.

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#### **CONFLICT OF INTEREST**

The author declares there is no conflict of interest in this study.

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