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Physical exercise post-treatment in breast cancer: a longitudinal study
Ejercicio físico postratamiento en cáncer de mama: un estudio longitudinal

*Nur Azis Rohmansyah, *Faza Annasai, *Abiyyu Amajida, *Sunaryo Sunaryo, **Rian Ka Praja, ***Yanyong Phanpheng, ****Neranoch Bumrung, ****Ashira Hiruntrakul

*Universitas Negeri Yogyakarta (Indonesia), **Universitas Palangka Raya (Indonesia), ***Loei Rajabhat University (Thailand), ****Khon Kaen University (Thailand)

Abstract. The prevalence of breast cancer has been progressively rising as a result of advancements in anti-cancer therapies, however, these patients also experience a variety of long-term adverse effects from their illness and treatments. The current study sought to determine how an exercise training intervention influenced physical and mental health indices in breast cancer patients. A total of 30 female breast cancer patients (aged 42.81 ± 3.31 years, body mass index (BMI) 26.87 ± 0.59 kg/m2, and waist circumference 97.61 ± 1.94 cm) engaged in 12 weekly exercise regimens twice weekly that comprised aerobic, resistance, and flexibility activities. The exercise intervention improved participants' cardiorespiratory fitness, BMI, waist circumference, and muscle function, including sitting to standing, sit-ups, and push-ups. It also showed positive results for post-traumatic stress disorder (PTSD) symptoms, self-reported fatigue, quality of life, and physical, cognitive, and emotional functioning ($p < 0.001$). In conclusion, our results imply that the advantages of an exercise training program may help breast cancer patients lessen the negative impacts of treatment-related factors on physical performance, overall quality of life, and mental health.

Keywords: breast cancer; physical exercise; anxiety; post-traumatic stress disorder; quality of life

Resumen. La prevalencia del cáncer de mama ha aumentado progresivamente como resultado de los avances en las terapias contra el cáncer; sin embargo, estos pacientes también experimentan una variedad de efectos adversos a largo plazo de su enfermedad y tratamientos. El estudio actual buscó determinar cómo una intervención de entrenamiento físico influyó en los índices de salud física y mental en pacientes con cáncer de mama. Un total de 30 pacientes de cáncer de mama femeninas (de 42,81 ± 3,31 años, índice de masa corporal (IMC) 26,87 ± 0,59 kg/m2 y circunferencia de cintura 97,61 ± 1,94 cm) participaron en 12 regímenes de ejercicio semanales dos veces por semana que comprendían actividades aeróbicas, de resistencia y de flexibilidad. La intervención de ejercicio mejoró la aptitud cardiorrespiratoria, el IMC, la circunferencia de la cintura y la función muscular de las participantes, incluyendo sentarse y ponerse de pie, abdominales y flexiones. También se observaron resultados positivos en los síntomas del trastorno de estrés postraumático (TEPT), la fatiga autoinformada, la calidad de vida y el funcionamiento físico, cognitivo y emocional ($p < 0,001$). En conclusión, nuestros resultados implican que las ventajas de un programa de entrenamiento físico pueden ayudar a las pacientes con cáncer de mama a reducir los impactos negativos de los factores relacionados con el tratamiento en el rendimiento físico, la calidad de vida general y la salud mental.

Palabras clave: cáncer de mama; ejercicio físico; ansiedad; trastorno de estrés postraumático; calidad de vida

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Ashira Hiruntrakul
hashir@kku.ac.th

Introduction

Breast cancer is one of the leading causes of mortality among women worldwide, including in Indonesia.[1] Pain is the condition that has the most impact on cancer patients' quality of life.[2–4] Cancer pain is frequently observed in daily practice in patients who first seek treatment; approximately 30% of cancer patients report pain, and nearly 70% of patients with advanced cancer are receiving treatment[5], however, it turns out that 20% of patients report pain complaints that are not related to their disease but rather are brought on by their treatment (tingling, decreased ability to feel pressure, touch, heat and cold, difficulty moving fingers to pick up and drop things and muscle weakness).[6] One to two months following the procedure, some patients who have a mastectomy or thoracotomy may experience pain in the vicinity of the incision.[3]

Patients recuperating from surgeries in the hospital feel additional discomfort. There is evidence that present pain therapy is frequently insufficient, despite the fact that acute and chronic pain exist. Older cancer patients receive poor pain management in over 70% of cases, according to treatment facilities. It was claimed that nurses were unaware that the primary objective of pain management following surgery was to make pain more acceptable rather than to eliminate it entirely.[7,8] By implementing well-planned pain management, some of these pain disorders may be alleviated. The objective is to lessen or eliminate pain altogether using either non-pharmacological, pharmacological or maybe a mix of both methods.[9,10]

Nonetheless, breast cancer sufferers if intervened with a healthy lifestyle can have a variety of positive effects on psychometric and physiological parameters, this is shown from the results of research in recent years.[11,12] Because it causes both acute and long-term physiological system changes, physical activity is especially advantageous for the health of the cardiorespiratory system, muscles, weight management, and

tiredness.[13–15] In addition, exercise can show improvements in loss of muscle mass and bone, loss of muscle mass, increased antioxidant capacity, better immune response, and regulation of sex hormones.[14–16]

Additionally, exercise therapies are helpful in reducing PTSD, anxiety, and depression as well as improving general health-related QoL. Exercise therapy can also help counteract a variety of other psychological and emotional stressors. Among the physiological effects of exercise that have been linked to the management of stress-related disorders are increased neurogenesis, hypothalamic-pituitary-adrenal (HPA) axis reactivity, monoamine and myokine formation, and the opioid system.[17–19]

Additionally, exercise lowers levels of anxiety and stress by making people adapt to and be exposed to situations and stimuli they previously thought were harmful. It also serves as a distraction from stressful conditions.[20] Nonetheless, physical activity or organized exercise programs have not reached the majority of breast cancer survivors, either because sports training facilities are inconveniently located, or they are not aware of the health benefits of exercise.[21]

Physical activity is essential for recovery, weight loss, pain management, returning to a regular way of life, and conditioning the body to support health and preserve physical health. Additionally, it is employed as a sort of therapy to treat abnormalities or restore the overall health of the body. A person's body will undergo physiological changes if they exercise.[22,23] Exercise and recuperation are intended to assist patients in adjusting to their cancer and treatment regimens and to help them get back to their regular lives. Evidence suggests that performing physical activities after surgery, such as walking, staying upright, and meditation, can lower the risk of lymphedema and shoulder stiffness as well as symptoms like fatigue, low blood counts, muscle atrophy, bone pain, neuropathy, muscle pain, reduced bone density, weight loss, increased body fat, and slowed metabolism.[24–26]

The theory behind this activity is that it might enhance coping skills and biopsychosocial systems, which in turn help lessen symptoms like post-operative pain. However, there is currently a dearth of information on the effects of exercise or physical activity on breast cancer patients post-mastectomy discomfort, necessitating more studies before it can be utilized to help treat individuals whose cancers have spread after a mastectomy. [24–26] Therefore, the purpose of the current study was to examine the possible benefits of a combined exercise program with routine analgesic medication, including both resistance training and aerobic, on post-mastectomy breast cancer patient's physical functioning, psychological parameters, and quality of life.

Methods

Participants

After receiving permission from their private doctors, a total of 30 post-mastectomy breast cancer patients, aged 42.81 ± 3.31 years, consented to take part in the study. An a priori power analysis using statistical software (G*power V 3.1.9.4) was completed to determine an adequate sample size. Sample size estimates were performed for the principal measure of post-mastectomy breast cancer, which is expected to have the least pre-post difference between groups. With a 0.5% difference between groups, a standard deviation of 0.8% throughout a 6-month training period, an alpha of 0.05, and power of 0.9 (to detect significance between multiple measures)[27], the sample size needed per group was 30. With a 25% predicted dropout rate, an initial sample size of 54 per experimental group was estimated. Patients with a complete or radical mastectomy who experienced discomfort, patients who used moderate opioid analgesics, and patients between the ages of 25 and 60 made up the inclusion criteria for this study. Patients who suffered post-mastectomy haemorrhage, patients with reduced levels of awareness, and patients who could not tolerate physical activity were all excluded from this research.

Protocol

This Pre-Experimental research was conducted at Sarjito Hospital, Yogyakarta, a tertiary trauma center, between June 2021 and June 2022 on post-mastectomy breast cancer patients. The trials were divided into two groups: those receiving standard analgesic treatment and those receiving physical therapy alongside it. This study was performed in accordance with the Declaration of Helsinki and approved by the Research and Ethics Committee of the Universitas Negeri Yogyakarta, Yogyakarta, Indonesia (ethics code: 117/UNY/EC/2021). Regarding data collection and management, all privacy regulations were followed.[27]

Following mastectomy, breast cancer patients participated in two group programs that included seven sessions per week and two sessions per week after the first week (Table 1). The program is carried out under the coordinated supervision of a sports scientist, during which all exercises are discussed in detail and each participant receives personalized corrective feedback each session.

Table 1.
Characteristics of a 1-year exercise training program in breast cancer patients.

Duration: 45-60 minutes	Session: 1	Session: 2
10 min	Warm up	Warm up
20 min	Aerobic (75-85% HRmax)	Aerobic (70-80% HRmax)
20 min	3 sets x 5-10 reps x 3 exercises (muscle group: arms, legs, chest, shoulders, back and trunk) (60 s rest between exercise, 60 s rest between sets)	4 sets x 6-12 reps x 4 exercises (muscle group: arms, legs, chest, shoulders, back and trunk) (45 s rest between exercise, 45 s rest between sets)
10 min	Cool down (flexibility exercise for all the major muscle groups) and breathing exercise	Cool down (flexibility exercise for all the major muscle groups) and breathing exercise

Over the duration of the exercise training program, which lasted a full year, reassessments of somatometric characteristics, physical performance, quality of life, reported anxiety, and post-mastectomy stress were done every four weeks.

Participants stood upright with their backs straight and barefoot for their height to be measured, and their body mass was measured using an electronic precision balance. BMI (kg/m^2) was then calculated: BMI (kg/m^2) = body mass (kg)/body height^2 (m^2). Furthermore, the tape measures the waist from the middle of the area between the iliac crests to the last visible rib.[28,29]

Breast cancer patients were assessed for aerobic capacity by carrying out a 6-minute walking test (6MWT)[30], with instructions to walk on a flat, hard surface at their own pace for six minutes, covering as much ground as possible while stopping when needed to rest and the distance traveled was then recorded. The Borg scale of 20 points was used to measure leg fatigue and dyspnea, and heart rate was measured before and after 6MWT. If the subject's resting heart rate (HR) was more than 100 bpm, their systolic blood pressure (SBP) was greater than 145 mmHg, or their diastolic blood pressure (DBP) was larger than 95 mmHg, they were not permitted to participate in the test.[31]

The function of muscle groups of the upper and lower limbs, as well as the abdomen in breast cancer patients, will be tested before, during, and after completing a sports training program using three unique muscle function assessment tests, namely the sit-to-stand test, which counts the number of times a person can sitting and rising from a chair for 60 seconds while crossing your arms over your chest, developed to evaluate lower extremity muscle performance.[32] According to the instructions, the maneuvers were to be completed as swiftly as possible while seated in an armless chair. The number of repetitions of push-ups and sit-ups completed in 60 seconds was used to assess upper extremity and abdominal muscular strength. The European Organization for Core Cancer Research and Care Quality of Life Questionnaire 30 (EORTC QLQ-C30, version 3.0) is used to measure the quality of life (QoL) for breast cancer patients by self-reporting the perceived quality of life in breast cancer patients by implementing it regularly.[33] This instrument combines single-question responses with multiple-item assessments of cognitive, physical, social, emotional, and role functioning, as well as cancer-specific symptoms and overall health status. Each scale produces a total score ranging from 0 to 100, with a higher number indicating a stronger reaction rate for that specific scale. As a result, whereas high symptom scale scores indicate a high degree of cancer-related symptomatology, high functional measures represent a greater level of health and well-being.

To evaluate general Post-Traumatic Stress Disorder (PTSD) symptoms, the PTSD Checklist Civilian version (PCL-C) was used consisting of 17 questions based on the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) self-reported breast cancer patients. can carefully describe how much they experienced each symptom over the past month, ranging from symptom intensity from not at all (one) to very (five). The overall score represents the intensity of PTSD symptomatology, with a higher total score indicating more severe symptoms. A score of 50 or above is frequently seen as indicating a full diagnosis of PTSD.[34]

The Zung Self-Rating Anxiety Scale (SAS) with 20 psychometric items measures each respondent's anxiety by rating each item from "rarely" to "always" on a 5-point scale based on how they viewed their personal situation in the previous week. To reduce the danger of bias in the answers, the questionnaire contains 15 items that display negative claims on anxiety and positive claims on the remaining five items. To determine the overall anxiety index is generated from the total score for each question multiplied by 1.25. Consequently, the raw score ranged from 20 to 80, while the final anxiety index ranged from 25 to 100, this is similar to the PCL-C scoring tool on the Zung scale index which shows low results on poor anxiety-related symptoms.[35]

Statistical Analysis

The Shapiro-Wilk test was used to determine if the data distribution was normal using the statistical application Stata (StataCorp LLC, USA), which also displays the mean and standard error of the mean (mean ± SE) used in descriptive statistics. Parametric paired t-tests were used to evaluate the questionnaire ratings at the two evaluation dates. In addition, one-way analysis of variance (ANOVA) was used to examine

how the intervention affected physiological and functional activities. $p < 0.05$ was set as the level of statistical significance.[36]

Results

A total of 30 female breast cancer patients (aged 42.81 ± 3.31 years, body mass index (BMI) 26.87 ± 0.59 kg/m2, and waist circumference 97.61 ± 1.94 cm) engaged in 12 weekly exercise regimens twice weekly that comprised aerobic, resistance, and flexibility activities. The exercise intervention improved participants' cardiorespiratory fitness, BMI, waist circumference, and muscle function, including sitting to standing, sit-ups, and push-ups. It also showed positive results for post-traumatic stress disorder (PTSD) symptoms, self-reported fatigue, quality of life, and physical, cognitive, and emotional functioning ($p < 0.001$).

Table 2.
Somatometric parameters of breast cancer patients after a year of exercise

Breat Cancer Patients	Baseline (Mean ± SE)	4 weeks	8 weeks	12 weeks
Age (yrs)	42.81 ± 3.31			
Height (cm)	155.60 ± 1.24			
Body Mass (kg)	72.43 ± 2.13	72.11 ± 2.09	70.89 ± 1.95	69.79 ± 1.53
Body Mass Index (kg/m^2)	26.87 ± 0.59	26.77 ± 0.57	26.34 ± 0.55	26.14 ± 0.53
Waist Circumference (cm)	97.67 ± 1.94	96.23 ± 2.11	93.42 ± 1.87	92.33 ± 1.63

Table 3.
Cardiorespiratory fitness-related measurements obtained as a consequence of exercise training regimens for breast cancer patients.

Cardiorespiratory fitness	Baseline (Mean±SE)	4 weeks	8 weeks	12 weeks
6MWT (Six Minute Walking Test) (m)	259.73 ± 11.89	323.73 ± 11.51**	352.62 ± 12.01***	373.29 ± 12.94***
Heart Rate	139.41 ± 1.21	137.66 ± 1.19**	135.23 ± 1.11**	134.36 ± 1.03**
Legs Fatigue	16.17 ± 0.93	15.86 ± 0.91*	14.25 ± 0.89*	13.96 ± 0.88*
Dyspnea	15.79 ± 0.72	14.58 ± 0.64***	13.91 ±0.61***	13.75 ± 0.58***

*= p < 0.05; **= p < 0.01; ***= p < 0.001

Table 4.
Muscle function performance changes in breast cancer patients with exercise training.

Muscle Function	Baseline (Mean±SEM)	4 weeks	8 weeks	12 weeks
Sit to Stand	12.47 ± 0.73	12.51 ± 0.78**	12.84 ± 0.82 **	13.01 ± 0.83**
Sit Ups	14.58 ± 0.68	14.62 ± 0.71***	14.65 ± 0.74***	14.70 ± 0.77***
Push Ups	6.53 ± 0.51	6.59 ± 0.54*	6.63 ± 0.59*	6.66 ± 0.63***

*= p < 0.05; **= p < 0.01; ***= p < 0.001

Table 5.
Changes in numerous QoL-related measures and symptoms among breast cancer patients enrolled in an exercise training program.

QoL	Baseline (Mean±SEM)	4 weeks	8 weeks	12 weeks
Overall	61.72 ± 4.57	65.47 ± 5.02	74.13 ± 4.19*	77.78 ± 5.26*
Physical Function	56.36 ± 5.11	62.48 ± 5.12	73.23 ± 5.49*	76.82 ± 5.66*
Cognitive Function	58.77 ± 4.27	65.39 ± 4.78	73.13 ± 3.52**	77.14 ± 4.63**
Emotional Function	61.35 ± 4.33	65.72 ± 5.32	74.21 ± 4.69*	76.84 ± 5.11*
Social Function	61.25 ± 4.63	63.63 ± 5.48	71.53 ± 4.19	76.37 ± 5.24
Role Function	60.56 ± 4.33	66.48 ± 4.72	71.51 ± 4.35	77.48 ± 5.42
Fatique	61.58 ± 4.30	45.52 ± 4.72	27.59 ± 4.36***	16.82 ± 3.92***
Pain	27.81 ± 5.83	22.82 ± 4.77	17.78 ± 4.76*	13.62 ± 4.66*

*= p < 0.05; **= p < 0.01; ***= p < 0.001

Table 6.
During the fitness training program, breast cancer patients' self-reported, perceived PTSD, and anxiety changed.

	Baseline (Mean±SEM)	4 weeks	8 weeks	12 weeks
PTSD (Post-Traumatic Stress Diserder	36.27 ± 2.49	29.53 ± 2.47	26.26 ± 2.31**	24.49 ± 2.11**
Anxiety	46.73 ± 3.64	44.62 ± 2.33	41.25 ± 2.16***	39.44 ± 2.04***

**= p < 0.01; ***= p < 0.001

Table 2 shows the somatometry data of the breast cancer patients in this study. The 12-week exercise program showed no change four weeks later ($p > 0.05$) but there was a decrease in BMI compared to baseline ($p > 0.001$). Furthermore, the 12-week exercise intervention showed a decrease in waist circumference ($p < 0.001$).

Table 3 shows the impact of the exercise training program

on parameters related to cardiorespiratory fitness in breast cancer patients. The increase in walking distance from the 6MWT test was 259.73 ± 11.89 m at the beginning of the test then sports training for 4 weeks increased to 323.73 ± 11.51 m ($p < 0.01$) further after 12 weeks the training program occurred increased to 373.29 ± 12.94 m ($p < 0.001$). In addition, in the 12-week training session, HR significantly fell below the baseline with a result at the start of the test of 139.41 ± 1.21 and at the end of the 12-week training of 134.36 ± 1.03 bpm ($p < 0.01$). Furthermore, there was a significant decrease in leg fatigue at the start of the test with a result of 16.17 ± 0.93, and at the end of the 12-week training session it became 13.96 ± 0.88 ($p < 0.05$). Similar to the other results, dyspnea at the start of the test was 15.79 ± 0.72 and at the end of the 12-week training session it was 13.75 ± 0.58 ($p < 0.001$).

Improvement after exercise intervention for 12 weeks in lower extremity muscle performance by Sit-to-stand test showed 12.47 ± 0.73 repetitions at baseline and showed an increase of 13.01 ± 0.83 repetitions after 12 weeks ($p < 0.01$). Significant improvement ($p < 0.001$) in core muscle function was also detected when comparing the number of repetitions of Sit-Ups performed at 12 weeks of the training program (14.70 ± 0.77 reps) to baseline (14.58 ± 0.68 reps). The performance of breast cancer patients during push-ups increased consistently starting from the beginning of 6.53 ± 0.51 repetitions, increased after eight weeks of exercise to 6.63 ± 0.59 repetitions ($p < 0.05$), and also increased after training for 12 weeks at 6.66 ± 0.63 reps ($p < 0.001$) (Table 4).

The EORTC-QLQ-C30 questionnaire was completed at the start and end of an exercise training program by breast cancer patients to self-evaluate many parameters related to QoL (table 5). The QoL score was higher after exercise (77.78 ± 5.26) compared to baseline (61.72 ± 4.57) ($p < 0.05$), indicating that exercise affects the overall quality of life. Self-reported similar results for physical function of 76.82 ± 5.66 ($p < 0.05$), emotional function of 76.84 ± 5.11 ($p < 0.05$), and cognitive function of 77.14 ± 4 .63 ($p < 0.01$). Scores for social roles and functions showed a tendency to increase (better) although without being significant ($p > 0.05$). Long-term cancer, fatigue, and perceived treatment-related symptoms showed an initial score of 61.58 ± 4.30, and after 12 weeks of sports practice showed a score of 16.82 ± 3.92. In addition, pain decreased from an initial value of 27.81 ± 5.83 to 13.62 ± 4.66, although this change was not significant ($p > 0.05$).

Breast cancer patients also used the Zung Self-Rating Anxiety Scale questionnaire as well as the PCL-C to self-report their PTSD and anxiety. In contrast to the majority of individuals 36.27 ± 2.49, only one person at baseline met the DSM-IV criteria for a complete PTSD diagnosis (score: 63). Overall, the 12-week exercise intervention reduced PTSD symptoms by 24.49 ± 2.11 ($p < 0.01$), furthermore, at baseline having a PTSD diagnosis was 36.27 ± 2.49. Additionally, the fitness training program resulted in a considerable decrease (score: 19). Additionally, the fitness training program significantly reduced the anxiety index in breast cancer patients (baseline: 46.73 ± 3.64 vs 12 weeks: 39.44 ± 2.04; $p < 0.001$; table 6).

Discussion

The results of the current study seek to determine how an exercise training program impacts individuals with breast cancer who also suffer from physical and mental health problems. The findings show that an exercise program for approximately four months for breast cancer patients which includes resistance, aerobic, and flexibility exercises is quite effective in improving physical performance, overall quality of life, somatometric traits, and psychological parameters including PTSD and anxiety.

Specifically, after 12 weeks of exercise intervention, indirect measures of BMI, waist circumference, and body composition improved markedly. A previously supervised exercise training program regimen for breast cancer patients that combined resistance and aerobic exercise produced similar results.[37,38]

In addition, the increase in 6MWT performance as well as changes in the variables associated with dyspnea, leg fatigue, and perceived effort at the end of this exercise training test indicate that it improves the cardiorespiratory fitness of breast cancer patients. To our knowledge, this study is the first to show that just over four months of exercise training can significantly improve aerobic capacity in breast cancer patients, although recent studies using exercise interventions lasting as long as four months have confirmed that exercise interventions can improve cardiorespiratory health in cancer survivors.[23,39–42] In addition, an approximately four-month exercise program for breast cancer patients significantly improved the assessment of muscle function in several muscle groups. These results are consistent with other trials[43,44] where distance exercise therapy was administered to different cancer patients either synchronously or asynchronously. Physical exercise regimens have been advocated to improve general functional capacity and quality of life for people with cancer, as well as to reduce their anxiety and PTSD symptoms.[22,37,40,45,46] The current study confirmed and added to existing results by demonstrating the value of an exercise training intervention in enhancing patients' overall QoL-related measures as well as

their mental health. Additionally, participating in this fitness training program had similar benefits on subjective pain and exhaustion as face-to-face supervised therapies, which were employed in earlier studies of cancer survivors.[17,47,48]

The results of this study, emphasizing the feasibility of a well-supervised exercise program in a clinical population, suggest that exercise is generally well tolerated by all breast cancer patients and has no effect on their adherence to the exercise program. In addition, the multiple mental and physical health benefits demonstrated even more after a shorter training period emphasize the efficiency and relevance of the program in improving the quality of life in breast cancer patients. These findings suggest that cancer survivors should be strongly encouraged to participate in exercise programs. However, it should be noted that the lack of a relatively small study sample size and control group is a drawback that could lead to an overestimation of the health benefits of fitness training for breast cancer survivors. In addition, it should be noted that long-term exercise therapy[23,39] or interventions where it is combined with other health modifications, such as providing lifestyle counseling or modification of dietary habits, may result in higher health outcomes.[49]

Sampling not all respondents are willing to do physical exercise on the first day. The patient still feels afraid to do physical exercise on the first day associated with the operation and the patient also feels that it will have a worse effect on the surgical wound. In administering analgesic therapy to respondents, the route of administration could not be distinguished because there were some patients who were given analgesic therapy by infusion, and there were also some patients who were injected directly intravenously and orally, even though the drugs were given the same type. So, the sample cannot be separated between the three routes of drug administration. There are a few difficulties because physical exercise can only be given after routine room activities such as doctor visits and changing wound dressings, these routine activities sometimes end at 10.00 A.M, so the time for doing physical exercise coincides with hospital visiting hours so that it makes the atmosphere uncomfortable and unsettled. But this only lasted on the first day, because on the second to the last day, the patient was able to walk and do physical exercises according to the place where he felt calmer and more comfortable.

The findings of the current study show that an exercise training program is essential to a realistic and highly successful treatment for breast cancer survivors, providing benefits to physical performance, quality of life, and mental health. In addition, by using this method, more survivors can participate in physical activity programs as part of a healthy lifestyle change and this method can also improve exercise adherence. This exercise intervention may also be used during the more serious stages of cancer treatment when access to a gym is not possible, or isolation is desired.

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Author Contributions

Conceptualization, N.A.R. and A.H.; methodology, N.A.R. and N.B.; validation, A.H.; formal analysis, N.A.R., A.A.Y., T.H., and U.H.Z.; resources, N.A.R. and A.H.; data curation, R.R., K.K., K.S., T.S. and N.W.; writing—original draft, R.R.; writing review and editing, N.A.R., R.K.P., M.I.N.W., A.W., D.A.F., and A.H.; supervision, A.H.; project administration, A.H. All authors have read and agreed to the published version of the manuscript.

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Datos de los/as autores/as y traductor/a:

Nur Azis Rohmansyah	nurazisrohmansyah@uny.ac.id	Autor/a
Faza Annasai	fazaannasai@uny.ac.id	Autor/a
Abiyyu Amajida	abiyyuamajida@uny.ac.id	Autor/a
Sunaryo	naryo1982@uny.ac.id	Autor/a
Rian Ka Praja	riankapraja@med.upr.ac.id	Autor/a – Traductor/a
Yanyong Phanpheng	yanyong.pha@lru.ac.th	Autor/a
Neranoch Bumrung	neranochh@kkumail.com	Autor/a
Ashira Hiruntrakul	hashir@kku.ac.th	Autor/a