



Article

Quasi-Experimental Study of Quality of Life and Functional Capacity after Breast Surgery: Short-Term Rehabilitation Program

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Abstract: Women undergoing breast surgery with axillary lymph node dissection continue to experience complications in the ipsilateral upper limb, impacting their daily lives and quality of life. This study aims to evaluate the relationship between quality of life (overall and specific) and the functional capacity of patients undergoing breast surgery with lymph node clearance before and after implementing a rehabilitation program. This short-term quasi-experimental study included 48 women, and the design did not include control groups. Data collection involved a sociodemographic and clinical characterization questionnaire, the Disabilities of the Arm, Shoulder and Hand questionnaire, and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core-30 and Breast Cancer questionnaires. The study revealed a significant negative association between all general functional subscales and the functionality of the ipsilateral upper limb, except for emotional (p 0.941) and cognitive (p 0.927) functional scales. The functional capacity of the ipsilateral upper limb following surgery influences the quality of life of women undergoing breast surgery. The study concluded that monitoring the quality of life is essential to underscore the importance of providing access to rehabilitation to minimize or eliminate these changes, thus contributing to a better quality of life for these women.

Keywords: recovery of function; rehabilitation nursing; rehabilitation program; axillary lymph node dissection; mastectomy



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1. Introduction

Breast cancer remains one of the leading causes of morbidity and mortality in women worldwide [1]. Despite advances in therapies and increased survival rates, this condition has long-term repercussions on mobility, psychological function, and Quality of Life (QoL) [1]. Its treatment results in sequelae for women who experience multiple physical, neuromuscular, and musculoskeletal disorders and pain, with the most common conditions being shoulder dysfunction, post-mastectomy syndrome, chemotherapy-induced peripheral neuropathy, axillary web syndrome, lymphedema [2], and upper limb disability [3].

The most common physical limitations are observed in elevating the ipsilateral upper limb to surgery, carrying heavy objects, driving, and performing manual labour, along

with a decreased range of motion and weakness in the upper limbs. Symptoms include breast/arm pain [4,5], fatigue, lymphedema, scar tissue adhesions in the breast/axilla, and paresthesias in the arm/breast [5].

Around 90% of breast cancer survivors suffer from long-term sequelae, which can result in physical, functional, emotional, and psychosocial alterations, with implications for QoL [6]. All types of breast cancer treatment can lead to some form of sequelae for women. Surgery, as the primary treatment for this condition [7], may include biopsy and Axillary Lymph Node Dissection (ALND), breast-conserving surgery, mastectomy, prophylactic bilateral mastectomy, and breast reconstruction [8], and it is responsible for numerous changes [5,6,9,10]. All these changes directly or indirectly impact a woman's daily life [11–16] and alter her QoL [10,11,17–21] in various domains. When ALND is added, the risk of developing upper limb alterations increases, such as reduced range of motion (flexion, external and internal rotation) and muscle strength, decreased Activities of Daily Living (ADLs), lymphedema, loss of power in the internal rotators, increased severity of adverse reactions in the breast, and increased pain [17,22–25].

Changes in body appearance and adverse effects have a significant impact on Activities of Daily Living (ADLs), reducing a person's ability to be independent and interfering with their daily life [16], affecting their Quality of Life (QoL) and autonomy [11]. Many women experience various symptoms in the arm and shoulder, leading to limitations in participating in ADLs (simple household tasks and personal care- and hygiene-related tasks). The movement of the upper limb is qualitatively less fluid (reach function), even if it appears that the action is performed correctly. This often leads women to seek assistance and generates dissatisfaction [26,27]. Therefore, these women present a set of changes that can be minimized or overcome with rehabilitation programs designed for this purpose. Oncology rehabilitation allows cancer and breast cancer survivors to achieve and maintain the highest possible physical, social, psychological, and vocational functioning within the limits created by the pathology and its treatments. In addition, evidence reinforces its safety and efficacy in the treatment of many breast cancer-related disabilities, including shoulder dysfunction and lymphedema, among others [2]. This study aims to evaluate the relationship between quality of life (overall and specific) and the functional capacity of patients undergoing breast surgery with lymph node clearance after implementing a rehabilitation program.

2. Results

2.1. Main Characteristics of the Total Sample

The sample consisted of 48 women who underwent breast surgery with Axillary Lymph Node Dissection (ALND) and met the mentioned inclusion criteria. Table 1 shows the main characteristics of the total sample. The average age was 49.2 years, with a predominance of ages between 40 and 50, ranging from a minimum of 28 years to a maximum of 79 years. Marital status was as follows: married (56.3%), followed by single (18.8%), divorced (14.6%), cohabiting (6.3%), and widowed (4.2%). The predominant surgical procedure was modified radical mastectomy at 47.9%, followed by lumpectomy plus ALND at 37.5%, total mastectomy plus ALND at 12.5%, and radical mastectomy with the lowest percentage of 2.1%.

Regarding personal history, most of the women had no personal history (60.4%), although a considerable proportion did have personal accounts (39.6%). Among the latter, there were 18 personal histories, with allergic rhinitis being the only repeated (only twice). Approximately 39.6% of the sample had a family history of breast cancer, while the remainder did not. For treatments received, the majority underwent radiation therapy (58.3%), followed by chemotherapy (35.4%), oral chemotherapy (4.2%), and chemotherapy + radiation therapy (2.1%).

No adverse events occurred during the trial.

Table 1. Main characteristics of the total sample.

	Characterization of the Sample
Average age	49.2 years
Civil status	56.3% married 18.8% single 14.6% divorced 6.3% cohabiting 4.2% widowed
Type of surgical procedure	47.9% modified radical mastectomy 37.5% lumpectomy with ALND 12.5% total mastectomy with ALND 2.1% radical mastectomy
Personal history	60.4% without personal history 39.6% with personal history
Family history of breast cancer	60.4% without family history 39.6% with family history
Treatments received	58.3% radiation therapy 35.4% chemotherapy 4.2% oral chemotherapy 2.1% chemotherapy + radiation therapy

2.2. Comparison between the Dimensions of the EORTC QLQ-C30 Questionnaire and the Dimensions of the DASH Questionnaire

To compare the results of the QLQ-C30 and DASH questionnaires, we analyzed the correlations between the subscales using the Spearman correlation coefficient. Subsequently, we compared the levels of these subscales using the Wilcoxon test (paired samples), and the results can be found in the following tables. We compared the functionality and symptomatology subscales of the QLQ-C30 and DASH questionnaires to provide meaningful analysis. These comparisons were conducted before and after the intervention program and for the respective differences.

2.2.1. Functional Subscales

Table 2 shows that before the program, only the correlation with the cognitive functioning scale ($p = 0.166$) was not significant (no association between the two). All others were significant ($p < 0.001$) and negative, indicating an inverse association between these subscales and the DASH score, meaning that higher (lower) scores on these subscales corresponded to lower (higher) scores on the DASH questionnaire. The intensity of the correlation varied among the functional subscales, but it is important to note that only one was weak, even with strong correlations:

- General health scale (Coef. -0.662), emotional functioning scale (Coef. -0.452), and social functioning scale (Coef. -0.538)—moderate intensity;
- Physical functioning scale (Coef. -0.803) and performance functioning scale (Coef. -0.799)—high intensity;
- Cognitive functioning scale (Coef. -0.203)—weak intensity.

After the program (Table 2), it was found that only the correlation with the emotional functioning scale ($p = 0.067$) was not significant (no association between the two). All others were significant and negative, indicating an inverse association between these subscales and the DASH score, meaning that higher (lower) scores on these subscales corresponded to lower (higher) scores on the DASH questionnaire:

- General health scale (Coef. -0.564), physical functioning scale (Coef. -0.533), and performance functioning scale (Coef. -0.482)—moderate intensity;
- Cognitive functioning scale (Coef. -0.349) and social functioning scale (Coef. -0.307)—weak intensity.

Table 2. Correlations between the functional subscales of EORTC QLQ-C30 and DASH before and after intervention and for program difference.

EORTC QLQ-C30 Functional Subscales	DASH					
	Before		After		Difference	
	Coef.	<i>p</i>	Coef.	<i>p</i>	Coef.	<i>p</i>
General health status	−0.662	<0.001	−0.564	<0.001	−0.584	<0.001
Physical	−0.803	<0.001	−0.533	<0.001	−0.631	<0.001
Performance	−0.799	<0.001	−0.482	0.001	−0.775	<0.001
Emotional	−0.452	0.001	−0.267	0.067	−0.011	0.941
Cognitive	−0.203	0.166	−0.349	0.015	0.014	0.927
Social	−0.538	<0.001	−0.307	0.034	−0.429	0.002

Only the correlations with the emotional functioning scale ($p = 0.941$) and the cognitive functioning scale ($p = 0.927$) were not significant (no association between these two subscales and DASH). All others were significant and negative, indicating an inverse association between these subscales and the DASH score, meaning that higher (lower) scores on these subscales corresponded to lower (higher) scores on the DASH questionnaire (Table 2). These were also moderate to strong correlations:

- General health scale (Coef. −0.584), physical functioning scale (Coef. −0.632), and social functioning scale (Coef. −0.429)—moderate intensity;
- Performance functioning scale (Coef. −0.775)—high intensity.

2.2.2. Symptomatology

Before the program (Table 3), there were only two significant correlations ($p < 0.001$), both moderate and positive, with fatigue and pain, which means that there was a moderate association in the same direction between these subscales and DASH. In other words, the higher (lower) the score of these subscales, the higher (lower) the score on the DASH questionnaire, which makes sense. The correlation of DASH with the other subscales was not significant, so it was assumed that they were not associated.

Table 3. Correlations between the symptomatology scales in the EORTC QLQ-C30 and DASH questionnaires before and after intervention and for program differences.

EORTC QLQ-C30 Symptomatology	DASH					
	Before		After		Difference	
	Statistics	<i>p</i>	Statistics	<i>p</i>	Statistics	<i>p</i>
Fatigue	732.0	0.002	1662.0	0.0002	1853.0	<0.001
Nausea and vomiting	31.0	<0.001	532.0	<0.001	2268.0	<0.001
Pain	1043.0	0.425	788.0	0.006	1186.5	0.802
Shortness of breath	77.0	<0.001	500.0	<0.001	2188.5	<0.001
Insomnia	972.0	0.186	1160.0	0.955	1717.5	<0.001
Loss of appetite	209.0	<0.001	720.0	0.001	2094.0	<0.001
Constipation	387.0	<0.001	984.0	0.204	2029.5	<0.001
Diarrhea	230.0	<0.001	720.0	0.001	2094.0	<0.001
Financial difficulties	901.0	0.065	1116.0	0.789	1680.0	0.0001

After the program (Table 3), there were significant correlations: fatigue, pain, and loss of appetite, all with a p -value of 0.001; nausea and vomiting (p -value 0.025) and shortness of breath (p -value 0.032), weak or moderate and all positive. This means there was an association in the same direction between these subscales and DASH. In other words, the higher (lower) the score of these subscales, the higher (lower) the score on the DASH questionnaire, which makes sense:

- Fatigue (Coef. 0.481), pain (Coef. 0.467), and loss of appetite (Coef. 0.469)—moderate intensity;
- Nausea and vomiting (Coef. 0.324) and shortness of breath (Coef. 0.309)—weak intensity.

As shown in Table 3, there were two significant correlations, both positive, with fatigue (p -value 0.041) and pain ($p < 0.001$), which means that the higher the score of these subscales, the higher the DASH score.

Regarding the comparison between the levels of general symptomatology and upper limb functionality before the program (Table 4), there were significant differences between DASH and the subscales fatigue (p -value 0.002), nausea and vomiting ($p < 0.001$), shortness of breath ($p < 0.001$), loss of appetite ($p < 0.001$), constipation ($p < 0.001$), and diarrhoea ($p < 0.001$). The average degree of DASH was observed to be greater/less healthy than the average level of symptomatology in these C30 subscales. In the remaining subscales, the differences from DASH were not significant, so it was assumed that a moderate degree of DASH was equal to the average level of symptomatology in these subscales.

Table 4. Comparisons between EORTC QLQ-C30 symptom levels and DASH before and after intervention and for program difference.

EORTC QLQ-C30 Symptomatology	DASH					
	Before		After		Difference	
	Coef.	p	Coef.	p	Coef.	p
Fatigue	0.570	<0.001	0.481	0.001	0.297	0.041
Nausea and vomiting	−0.060	0.684	0.324	0.025	−0.071	0.633
Pain	0.699	<0.001	0.467	0.001	0.542	<0.001
Shortness of breath	0.100	0.500	0.309	0.032	−0.024	0.873
Insomnia	0.261	0.073	0.118	0.424	−0.014	0.925
Loss of appetite	0.246	0.092	0.469	0.001	0.074	0.616
Constipation	0.070	0.634	0.278	0.056	0.075	0.611
Diarrhea	0.028	0.852	0.063	0.672	−0.128	0.387
Financial difficulties	0.220	0.133	0.207	0.158	0.153	0.300

After the program (Table 4), there were significant differences between the DASH questionnaire score and the subscales fatigue (p -value 0.0002), nausea and vomiting ($p < 0.001$), pain ($p < 0.006$), shortness of breath ($p < 0.001$), loss of appetite (p -value 0.001), and diarrhoea (p -value 0.001):

- Fatigue (Coef. 1662.0), pain (Coef. 788.0), loss of appetite (Coef. 720.0), diarrhoea (Coef. 720.0)—It was observed that the average degree of DASH was lower/healthier than the average level of symptomatology in these C30 subscales;
- Nausea and vomiting (Coef. 532.0), shortness of breath (Coef. 500.0)—It was observed that the average degree of disability of DASH was greater/less healthy than the average level of symptomatology in these C30 subscales.

Regarding the difference between the levels of general symptomatology and upper limb functionality (Table 4), there were significant differences between DASH score and the subscales fatigue ($p < 0.001$), nausea and vomiting ($p < 0.001$), shortness of breath ($p < 0.001$), insomnia ($p < 0.001$), loss of appetite ($p < 0.001$), constipation ($p < 0.001$), diarrhoea ($p < 0.001$), and financial difficulties (p -value 0.0001). The average degree of DASH was observed to be lower/healthier than the average level of symptomatology in these C30 subscales. In the pain subscale (p -value 0.802), the difference from DASH was not significant, so it was assumed that the average degree of DASH was equal to the average level of symptomatology in this subscale.

2.3. Comparison between the Dimensions of the EORTC QLQ-BR23 Questionnaire and the Dimensions of the DASH Questionnaire

To compare the EORTC QLQ-BR23 and DASH questionnaires, we employed the Spearman correlation coefficient to analyze the correlations between their respective subscales. Additionally, we used the Wilcoxon test for paired samples to compare the levels of these subscales. To ensure the analysis was meaningful, we compared specific functionality (body image, sexual functioning, sexual enjoyment, future perspective) and specific symptomatology (side effects of systemic therapy, breast symptoms, arm symptoms) subscales of the QLQ-BR23 with DASH. These comparisons were made before and after the intervention program, as well as for the differences.

2.3.1. Body Image, Sexual Functioning, Sexual Enjoyment, and Future Perspective

Before the program (Table 5), body image ($p = 0.004$) and future perspective ($p = 0.029$) showed significant negative correlations, indicating an inverse association with DASH. In simpler terms, higher scores on these subscales corresponded to lower scores on the DASH questionnaire. The correlation strength was moderate for body image (Coef. -0.411) and weak for future perspective (Coef. -0.316).

Table 5. Correlations between specific functionality subscales of EORTC QLQ-BR23 and DASH before and after intervention and for program difference.

EORTC QLQ-BR23 Specific Functionality	DASH					
	Before		After		Difference	
	Coef.	<i>p</i>	Coef.	<i>p</i>	Coef.	<i>p</i>
Body image	-0.411	0.004	-0.401	0.005	-0.219	0.134
Sexual functioning	-0.248	0.090	-0.264	0.070	-0.063	0.673
Sexual pleasure	-0.422	0.057	-0.076	0.744	-0.234	0.384
Future outlook	-0.316	0.029	-0.185	0.209	-0.155	0.293

After the program (Table 5), only the correlation with body image ($p = 0.005$) remained significant. It was negative and moderate (Coef. -0.401), meaning that higher scores on the body image subscale correlated with lower scores on the DASH questionnaire. The correlations of DASH with the other subscales were not significant, indicating no association.

2.3.2. Side Effects of Systemic Therapy, Breast Symptoms, and Arm Symptoms

Before the program (Table 6), only the correlation with the arm symptoms subscale was significant ($p < 0.001$). It was positive and strong (Coef. 0.701), suggesting a direct association between this subscale and DASH. In simpler terms, higher scores on the arm symptoms subscale corresponded to higher scores on the DASH questionnaire.

Table 6. Correlations between specific symptomatology of EORTC QLQ-BR23 and DASH before and after intervention and for program difference.

EORTC QLQ-BR23 Specific Symptomatology	DASH					
	Before		After		Difference	
	Coef.	<i>p</i>	Coef.	<i>p</i>	Coef.	<i>p</i>
Side effects of systemic therapy	0.199	0.176	0.388	0.006	-0.212	0.147
Breast symptoms	0.273	0.060	0.209	0.154	0.091	0.539
Arm symptoms	0.701	<0.001	0.573	<0.001	0.669	<0.001

After the program (Table 6), correlations with the side effects of systemic therapy subscale ($p = 0.006$) and arm symptoms subscale ($p < 0.001$) were significant and positive. The former had a weak correlation (Coef. 0.388), while the latter had a moderate one (Coef. 0.669).

0.573). This implied a direct association between these subscales and DASH, with higher scores on these subscales correlating with higher scores on DASH.

Regarding the difference (Table 6), only the correlation with the arm symptoms subscale was significant ($p < 0.001$), and it was positive and moderate (Coef. 0.669). This indicated a direct association between this subscale and DASH, where higher scores on the arm symptoms subscale corresponded to higher scores on the DASH questionnaire.

Concerning the comparison of specific symptomatology levels and DASH (Table 7) before the program, significant differences were observed between DASH and the side effects of systemic therapy subscale ($p < 0.001$) and breast symptoms subscale ($p < 0.001$). The average level of DASH was higher/less healthy than the average level of symptomatology in these BR23 subscales.

Table 7. Comparison of specific symptomatology levels between EORTC QLQ-BR23 and DASH before and after intervention and for the difference.

EORTC QLQ-BR23 Specific Symptomatology	DASH					
	Before		After		Difference	
	Statistics	<i>p</i>	Statistics	<i>p</i>	Statistics	<i>p</i>
Side effects of systemic therapy	276.0	<0.001	1664.0	0.0002	2169.0	<0.001
Breast symptoms	347.5	<0.001	1171.5	0.888	2038.5	<0.001
Arm symptoms	892.0	0.056	928.0	0.092	1429.5	0.042

After the program (Table 7), only the difference between DASH and the side effects of systemic therapy subscale was significant ($p = 0.0002$), with the average level of DASH being lower/healthier than the average level of symptomatology in this BR23 subscale.

Table 7 reveals significant differences between DASH and all subscales (side effects of systemic therapy and breast symptoms with a p -value < 0.001 and arm symptoms with a p -value of 0.042). This demonstrated that the average level of DASH was lower/healthier than the average level of symptomatology in the BR23 subscales.

3. Discussion

Despite advancements, treatments for breast cancer still lead to complications such as arm, shoulder, and hand disability; pain, numbness, weakness, and stiffness (in the arm, shoulder, and hand); and a decrease in overall quality of life. This study aims to evaluate the relationship between quality of life (overall and specific) and the functional capacity of women who underwent breast surgery with lymph node dissection after implementing a rehabilitation program.

Before the program, women displayed alterations in the arm, shoulder, and hand (the upper limb on the same side as the surgery); treatment side effects; and decreased quality of life across various functional dimensions, as observed in other studies [6,12,17,21]. Shoulder dysfunction is associated with a reduced ability to perform ADLs [12,26,27] and decreased quality of life [10,28,29]. This individual home-based nursing rehabilitation program significantly contributed to the improvement in quality of life, as shown in another study [28]; furthermore, it reduced the number of trips to the hospital/clinic.

When comparing the subscales of symptomatology between the EORTC QLQ-C30 and DASH, two significant correlations were found in the difference before and after the program regarding fatigue and pain. Higher symptomatology scores for fatigue and pain correlated with more significant disability in the arm, shoulder, and hand. These results are consistent with the study by Akezaki et al. [28], which reported that higher DASH scores were associated with worse fatigue and pain symptomatology. Additionally, when comparing the subscales of the EORTC QLQ-BR23 with DASH concerning the difference before and after the program, a significant correlation was found with the arm symptoms subscale. This indicates that higher arm symptomatology corresponds to more significant disability in the arm, shoulder, and hand. These results contradict the study by

Greff et al. [30], which found no association between upper limb functionality and QoL (EORTC BR 23).

In a rehabilitation program that included informational pamphlets and a structured early exercise program lasting 12 months for women, mainly with ALND, who underwent radiotherapy, improvements were observed in upper limb physical functionality, pain, and quality of life [31], further corroborating our findings.

Rehabilitation nursing significantly contributed to the overall improvement in physical, emotional, cognitive, and social functioning, as well as the overall Quality of Life (QoL) of women who underwent breast surgery with Axillary Lymph Node Dissection (ALND), along with the functional capacity of the upper limb on the same side as the surgery. Higher levels of overall functioning (except emotional and cognitive functional scales) led to lower upper limb disability.

As demonstrated, monitoring the quality of life is crucial to understanding how upper limb functional disabilities holistically affect the lives of women who have undergone breast surgery. Therefore, it is essential to monitor the progress of specialized rehabilitation nurses to minimize or even eliminate these alterations and promote health gains in women who underwent breast surgery with ALND, involving and empowering them in their recovery and adaptation to their new condition, thereby contributing to an improved quality of life. Furthermore, it was evident that the quality of life of women who underwent breast surgery with ALND was affected by arm, shoulder, and hand disability, consistent with another study [28], which found that the quality of life (EORTC QLQ-C30) of patients after breast cancer surgery is significantly impacted by upper limb dysfunction.

Strengths and Limitations

This non-randomized, short-term clinical trial, which lacked control groups and followed a single-group pre-test–post-test design, holds particular value for evaluating the relationship between quality of life, both overall and specific, and the functional capacity of patients undergoing breast surgery with lymph node removal before and after the implementation of a rehabilitation program.

The absence of a control group allows for the direct observation of the intervention's therapeutic effects over time. Furthermore, given the ethical considerations against withholding beneficial interventions, this study design is practical and ethical.

Despite its potential, it is crucial to acknowledge the study's limitations. The lack of a control group confounds the isolation of the intervention's effects. The study may be influenced by selection bias and confounding variables such as participant age, post-surgery duration, and the specific stage and type of treatment. With only 48 women in the cohort, the findings' applicability to a broader population is limited. Additionally, the three-month follow-up period may not be sufficient to fully assess the long-term impacts of the program or potential regression in subsequent periods. The reliance on self-reported outcomes, which are disposed to individual interpretation and the primary investigator's home visits to improve adherence, could introduce the Hawthorne effect or affect external validity. Including assessments of range of motion and muscle strength could have provided a more accurate evaluation of the program's effectiveness. The trial protocol was recorded retrospectively, introducing a significant risk of bias due to selective reporting.

Future studies should explore the broader implications of rehabilitation nursing interventions over longer follow-up periods and consider the effects of confounding variables such as age, stage, and type of treatment.

4. Materials and Methods

4.1. Participants and Study Design

This short-term, non-randomized clinical trial (quasi-experimental), without control groups included in the design, was conducted in women's homes following their discharge from the nursing clinic at a Portuguese Hospital Center between February 2018 and June 2019. The non-probabilistic convenience sampling technique was employed,

with 48 women undergoing breast surgery with Axillary Lymph Node Dissection (ALND) participating. Inclusion criteria were established: healed surgical wounds (with no time frame after surgery), age over 18 years, patients with decision-making capacity, no musculoskeletal limitations before surgery, and no participation in other rehabilitation programs. The sample size was calculated using G * Power 3.1.9.2 [32], referencing the paired t-test with an effect size of 0.5, a probability error (α) of 0.05, and a power ($1-\beta$ error prob) of 0.95. The pre-test is the first moment of evaluation (single observational measurement), the intervention corresponds to the application of the rehabilitation nursing program to women undergoing breast surgery with axillary lymph node dissection, and the post-test refers to measurement three months after the implementation of the program.

The study received favorable approval from the institution's ethics committee (298/17). Women were recruited at their homes after initial contact with the principal investigator. Participation was voluntary, and participants signed informed consent forms with ethical principles adhering to the Declaration of Helsinki. Data collection occurred at two-time points: before and after the nursing rehabilitation program. Data collection instruments included a sociodemographic and clinical characterization questionnaire, the "Disabilities of the Arm, Shoulder, and Hand (DASH)" questionnaire, and the EORTC QLQ-C30 and BR 23 questionnaires.

The clinical trial protocol was registered retrospectively and is publicly available at https://osf.io/yznqc/?view_only=25bf54978dc242428bbd15f741b2ad35, accessed on 2 June 2024. The corresponding author will make the data supporting this study's results available upon request. The trial was conducted following GCP (Good Clinical Practice).

The Consolidated Standards of Reporting Trials (CONSORT) Statement guidelines were followed to ensure that our manuscript presents comprehensive, clear, and transparent reports of our methodology and findings.

4.2. Description of the Rehabilitation Program

A nursing rehabilitation program was developed based on a literature review from various sources of information, including databases, repositories, and aggregating systems. Subsequently, it was reviewed and validated by a group of experts in the field. This program consists of sessions covering lymphedema reduction measures (provided in a flyer), exercises to mobilize the cervical spine and the upper limb on the same side as the surgery (illustrated in a flyer with exercise photos—Supplementary Materials), and scar and upper limb massage. During the initial home visit, the principal investigator, a rehabilitation nurse, conducted a session in which she explained, taught, instructed, and trained the participants. This continued until the women were able to demonstrate the exercises correctly on their own. Everyday materials were used as resources, including a broomstick handle, a bath towel for exercises, and daily moisturizing cream for the massage. Over three months, the women conducted the program daily (seven days a week), with each session lasting 45 min and repeating each exercise 10 times [28,33–35]. The principal investigator visited the participants' homes weekly to supervise the program, promote adherence, detect complications, reduce frequent hospital visits, and enhance overall comfort. All patients reported full compliance with rehabilitation exercises, and none dropped out from the program.

4.3. Outcomes and Assessment Measures

4.3.1. Disabilities of the Arm, Shoulder, and Hand (DASH)

Over time, DASH assesses symptoms and physical functionality in the upper limbs (hand, wrist, elbow, and shoulder). The American Academy of Orthopaedic Surgeons developed it with the Institute for Work and Health in Toronto, Canada [36]. It demonstrates robust internal consistency and test-retest reliability [37]. It has been translated and validated for the Portuguese population by J. Santos and Gonçalves [38]. Permission for its use was obtained via email.

This self-administered instrument includes 30 questions assessing an individual's physical, psychological, and social functioning [3]. Scores range from 0 (no disability) to 100 (severe disability) based on responses on a scale of one to five. Each item provides five response options [39]. Changes detected between 8 and 15 points are considered minimal; a score of 15 or higher indicates significant impairment; scores between 16 and 40 suggest a still-tolerable problem; and scores above 40 indicate that patients cannot work [40].

4.3.2. European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30) Version 3.0

This questionnaire was developed to assess various aspects of defining cancer patients' Quality of Life (QoL) [41]. It is protected by copyright, translated and validated in over 110 languages, and used in more than 3000 studies worldwide [42], with version 3.0 being the most recent. It is a core questionnaire that, when used with a specific module, enhances the ability to detect clinically significant long-term differences in QoL [43]. It was designed to be complemented with modules that examine specific aspects of QoL for distinct patient groups [30]. It is validated and translated for the Portuguese population [44], exhibiting robust psychometric characteristics. The health and overall QoL scale demonstrate a Cronbach's alpha of 0.88, indicating adequate internal consistency.

Furthermore, the corresponding subscales exhibit values ranging from 0.57 to 0.87, with notable emphasis on cognitive and emotional functioning. The scale also shows sensitivity to different types of cancer but not to different disease stages [44]. It assesses health-related QoL in individuals with oncological diseases.

It includes 30 questions consisting of five functional scales (physical, emotional, cognitive, social, and role/functioning), three symptom scales (fatigue, pain, nausea, and vomiting), a global assessment scale (health and QoL), and six unique items evaluating oncological disease symptoms (shortness of breath, loss of appetite, sleep disturbances, constipation, and diarrhoea), as well as the perception of the financial impact of the disease and treatment [45]. The response format uses a Likert-type scale from one to four for functional and symptom scales and a scale from one to seven for the global health scale (questions 29 and 30). Scores for the scales and items are calculated using the formula provided in the specific EORTC QLQ-C30 manual. To facilitate statistical interpretation and psychometric validation, all scale and object scores have been transformed into values on a scale of 0–100. For the five functional scales and the global health scale, a higher score represents a better level of functioning. For symptom-oriented scales and items, a higher score corresponds to a higher level of symptomatology [45].

4.3.3. European Organization for Research and Treatment of Cancer Quality of Life Questionnaire for Breast Cancer (EORTC QLQ-BR23)

This is a specific module designed to assess the Quality of Life (QoL) of women with breast cancer during disease and treatment. It should be used in conjunction with the EORTC QLQ-C30. The institution provides only one Portuguese translation [46].

It includes two scales and 23 items. The first scale consists of four functional subscales (body image, sexual functioning, sexual enjoyment, and future perspective) that evaluate the patient's physical functioning at the time of diagnosis and during cancer treatment. The second scale also consists of four symptom subscales (systemic therapy side effects, breast symptoms, arm symptoms, and hair loss concern), which assess disease symptoms and treatment-related side effects reported by patients [45].

It demonstrates high internal consistency for four out of five scales, good discriminative capacity for known groups [30], and good reliability and convergent validity in some domains, except for the symptom scale [46]. It has cross-cultural validity (Spanish, Dutch, and American populations), detecting differences between groups based on disease stage, previous surgery, and other treatment methods. The reliability for the entire research group (Cronbach's alpha) is 0.70, but there are differences among the different versions of the questionnaire: Spanish version—reliability from 0.46 to 0.94; Dutch version—reliability

from 0.57 to 0.89; American version—reliability ranging from 0.70 to 0.91. The validity (2nd edition) proved sufficient, and the reliability was moderate, demonstrating the ability to detect differences over time [30].

To determine the scores for the scales and items, it is necessary to use the specific manual for the EORTC QLQ-C30, which includes the assessment of specific modules. The questions are scored on Likert-type scales, where higher values indicate lower Quality of Life (QoL), except for questions 44, 45, and 46, where a higher score indicates better QoL [47].

Due to significant changes in breast cancer treatment and diagnosis in recent years, the QLQ-BR23 has been updated to the new BR-45 questionnaire. To provide a more comprehensive and accurate instrument, 22 questions have been added to the questionnaire. This new BR-45 questionnaire is being tested on breast cancer patients in different countries. This update represents an important step in improving the care and follow-up of these patients, offering a more holistic and practical approach to treating this disease [48].

4.4. Statistical Analysis

The collected data were analyzed and presented using the Statistical Package for the Social Sciences—IBM SPSS® Statistics, version 25.0 for Windows, employing specific statistical methods and techniques.

The Spearman correlation coefficient was employed to examine the correlations between the subscales of the quality-of-life questionnaires (EORTC QLQ-C30 and BR23) and the DASH questionnaire. Additionally, the Wilcoxon test (paired samples) was used to compare the levels of these subscales.

5. Conclusions

Rehabilitation nursing significantly improved the physical, emotional, cognitive, and social functioning, as well as the overall Quality of Life (QoL), of women who underwent breast surgery with Axillary Lymph Node Dissection (ALND). It also enhanced the functional capacity of the upper limb on the surgery side. Higher overall functioning (except in emotional and cognitive areas) was linked to reduced upper limb disability, while greater symptom severity (e.g., fatigue, pain) led to more disability. Breast cancer treatment impacts upper limb functionality and QoL, underscoring the need for strategies to maintain functional capacity. A three-month home-based rehabilitation program supervised by a specialized nurse showed positive health outcomes and empowered women in their recovery. In Portugal, legislation provides specialized rehabilitation nurses within the National Health Service (public and free) in hospitals and the community who can intervene in this field. The increased involvement of rehabilitation nurses is recommended, along with further studies to explore upper limb disability prevention and QoL improvement.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/women4040027/s1>, Table S1. Exercises to mobilize the cervical spine and the upper limb.

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References

1. Amatya, B.; Khan, F.; Galea, M.P. Optimizing post-acute care in breast cancer survivors: A rehabilitation perspective. *J. Multidiscip. Healthc* **2017**, *10*, 347–357. [CrossRef] [PubMed]
2. Stubblefield, M.D. The underutilization of rehabilitation to treat physical impairments in breast cancer survivors. *PMR J. Inj. Funct. Rehabil.* **2017**, *9* (Suppl. S2), S317–S323. [CrossRef] [PubMed]
3. Davies, C.C.; Lengerich, A.; Bugajski, A.; Brockopp, D. Detecting change in activity using the Patient-Specific Functional Scale with breast cancer survivors. *Rehabil. Oncol.* **2018**, *36*, 117–122. [CrossRef]
4. De Groef, A.; Meeus, M.; De Vrieze, T.; Vos, L.; Van Kampen, M.; Christiaens, M.-R.; Neven, P.; Geraerts, I.; Devoogdt, N. Pain characteristics as important contributing factors to upper limb dysfunctions in breast cancer survivors at long term. *Musculoskelet. Sci. Pract.* **2017**, *29*, 52–59. [CrossRef]
5. Zomkowski, K.; Souza, B.C.; Silva, F.P.; Moreira, G.M.; Cunha, N.S.; Sperandio, F.F. Physical symptoms and working performance in female breast cancer survivors: A systematic review. *Disabil. Rehabil.* **2018**, *40*, 1485–1493. [CrossRef] [PubMed]
6. Lovelace, D.L.; McDaniel, L.R.; Golden, D. Long-term effects of breast cancer surgery, treatment, and survivor care. *J. Midwifery Women's Health* **2019**, *64*, 713–724. [CrossRef] [PubMed]
7. Akram, M.; Iqbal, M.; Daniyal, M.; Khan, A.U. Awareness and current knowledge of breast cancer. *Biol. Res.* **2017**, *50*, 33. [CrossRef]
8. American Cancer Society. Surgery for Breast Cancer [Internet]. Cancer.org. American Cancer Society. 2014. Available online: <https://www.cancer.org/cancer/breast-cancer/treatment/surgery-for-breast-cancer.html> (accessed on 2 June 2024).
9. Dias, L.V.; Muniz, R.M.; Viegas, A.C.; Cardoso, D.H.; Amaral, D.E.; Pinto, B.K. Mulher mastectomizada por câncer de mama: Vivência das atividades cotidianas. *Rev. Pesqui. Cuid. É Fundam.* **2017**, *9*, 1074–1080. Available online: <http://seer.unirio.br/cuidadofundamental/article/view/5821/pdf> (accessed on 2 June 2024). [CrossRef]
10. Möller, U.O.; Beck, I.; Rydén, L.; Malmström, M. A comprehensive approach to rehabilitation interventions following breast cancer treatment: A systematic review of systematic reviews. *BMC Cancer* **2019**, *19*, 472. [CrossRef]
11. Light, K.M.; Heins, M.; Verloop, J.; Ezendam, N.P.; Smorenburg, C.H.; Korevaar, J.C.; Siesling, S. The impact of health symptoms on health-related quality of life in early-stage breast cancer survivors. *Breast Cancer Res. Treat.* **2019**, *178*, 703–711. [CrossRef]
12. Mokhatri-Hesari, P.; Montazeri, A. Health-related quality of life in breast cancer patients: Review of reviews from 2008 to 2018. *Health Qual. Life Outcomes* **2020**, *18*, 338. [CrossRef] [PubMed]
13. Wilson, D.J. Exercise for the patient after breast cancer surgery. *Semin. Oncol. Nurs.* **2017**, *33*, 98–105. [CrossRef] [PubMed]
14. Letellier, M.-E.; Mayo, N. Assessment of breast cancer disability: Agreement between expert assessment and patient reports. *Disabil. Rehabil.* **2017**, *39*, 798–808. [CrossRef] [PubMed]
15. Liu, L.; Wu, Y.; Cong, W.; Hu, M.; Li, X.; Zhou, C. Experience of women with breast cancer undergoing chemotherapy: A systematic review of qualitative research. *Qual. Life Res.* **2021**, *30*, 1249–1265. [CrossRef]
16. Wang, Q.-X.; Bai, Y.; Lu, G.-F.; Zhang, C.-Y. Perceived health-related stigma among patients with breast cancer. *Chin. Nurs. Res.* **2017**, *4*, 158–161. [CrossRef]
17. Tarkowska, M.; Głowacka-Mrotek, I.; Nowikiewicz, T.; Goch, A.; Zegarski, W. Quality of life in women subjected to surgical treatment of breast cancer depending on the procedure performed within the breast and axillary fossa: A single-center, one year prospective analysis. *J. Clin. Med.* **2021**, *10*, 1339. [CrossRef]
18. Hsiao, F.H.; Kuo, W.H.; Jow, G.M.; Wang, M.Y.; Chang, K.J.; Lai, Y.M.; Chen, Y.-T.; Huang, C.S. The changes of quality of life and their correlations with psychosocial factors following surgery among women with breast cancer from the post-surgery to post-treatment survivorship. *Breast* **2019**, *44*, 59–65. [CrossRef]
19. Słowik, A.J.; Jabłoński, M.J.; Michałowska-Kaczmarczyk, A.M.; Jach, R. Evaluation of quality of life in women with breast cancer, with particular emphasis on sexual satisfaction, future perspectives and body image, depending on the method of surgery. *Psychiatr. Pol.* **2017**, *51*, 871–888. [CrossRef]
20. Vieira, A.A.; Garcia, B.; Sarilho, D.; da Silva, G.G.; Brocco, S.M.; Gonçalves, A.C.; Vasconcelos, E.C. Qualidade de vida de mulheres submetidas ao tratamento do câncer de mama: Estudo transversal. *Rev. Interdiscip. De Saúde E Educação* **2020**, *1*, 35–55. [CrossRef]
21. Zabit, F.; Iyigun, G. A comparison of physical characteristics, functions and quality of life between breast cancer survivor women who had a mastectomy and healthy women. *J. Back Musculoskelet. Rehabil.* **2019**, *32*, 937–945. [CrossRef]
22. Mairink, A.P.; Gradim, C.V.; Prado, M.A.; Panobianco, M.S. Vivência de mulheres jovens diante da neoplasia mamária. *Rev. Bras. De Cancerol.* **2020**, *66*, 1–10.
23. Głowacka-Mrotek, I.; Tarkowska, M.; Nowikiewicz, T.; Siedlecki, Z.; Zegarski, W.; Hagner, W. Evaluation of distant sequelae of breast cancer treatment among patients after breastconserving surgery depending on the type of intervention in the axillary fossa. *Contemp. Oncol.* **2018**, *22*, 240–246. [CrossRef]

24. Belmonte, R.; Messaggi-Sartor, M.; Ferrer, M.; Pont, A.; Escalada, F. Prospective study of shoulder strength, shoulder range of motion, and lymphedema in breast cancer patients from pre-surgery to 5 years after ALND or SLNB. *Support. Care Cancer* **2018**, *26*, 3277–3287. [CrossRef] [PubMed]
25. Chan, K.S.; Zeng, D.; Leung, J.H.; Ooi, B.S.; Kong, K.T.; Yeo, Y.H.; Goo, J.T.; Chia, C.L. Measuring upper limb function and patient reported outcomes after major breast cancer surgery: A pilot study in an Asian cohort. *BMC Surg.* **2020**, *20*, 108. [CrossRef]
26. Paolucci, T.; Capobianco, S.V.; Bai, A.V.; Bonifacino, A.; Agostini, F.; Bernetti, A.; Paoloni, M.; Cruciani, A.; Santilli, V.; Padua, L.; et al. The reaching movement in breast cancer survivors: Attention to the principles of rehabilitation. *J. Bodyw. Mov. Therap.* **2020**, *24*, 102–108. [CrossRef]
27. Lang, A.E.; Kim, S.Y.; Dickerson, C.R.; Milosavljevic, S. Measurement of objective shoulder function following breast cancer surgery: A scoping review. *Phys. Ther. Rev.* **2020**, *25*, 253–268. [CrossRef]
28. Akezaki, Y.; Nakata, E.; Kikuuchi, M.; Tominaga, R.; Kurokawa, H.; Okamoto, M.; Hamada, M.; Aogi, K.; Ohsumi, S.; Sugihara, S. Investigation of factors affecting early quality of life of patients after breast cancer surgery. *Healthcare* **2021**, *9*, 213. [CrossRef]
29. Zhou, K.; Wang, W.; An, J.; Li, M.; Li, J.; Li, X. Effects of progressive upper limb exercises and muscle relaxation training on upper limb function and health-related quality of life following surgery in women with breast cancer: A clinical randomized controlled trial. *Annu. Surg. Oncol.* **2019**, *26*, 2156–2165. [CrossRef]
30. Sprangers, M.; Groenvold, M.; Arraras, J.I.; Franklin, J.; Velde, A.; Muller, M.; Franzini, L.; Williams, A.; Haes, H.C.; Hopwood, P.; et al. The European Organization for Research and Treatment of Cancer breast cancer-specific quality-of-life questionnaire module: First results from a three-country field study. *J. Clin. Oncol.* **1996**, *14*, 2756–2768. [CrossRef]
31. Bruce, J.; Mazuquin, B.; Mistry, P.; Rees, S.; Canaway, A.; Hossain, A.; Williamson, E.; Padfield, E.J.; Lall, R.; Richmond, H.; et al. Exercise to prevent shoulder problems after breast cancer surgery: The PROSPER RCT. *Health Technol. Assess.* **2022**, *26*, 1–124. [CrossRef]
32. Faul, F.; Erdfelder, E.; Lang, A.-G.; Buchner, A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav. Res. Methods* **2007**, *39*, 175–191. [CrossRef] [PubMed]
33. Kikuuchi, M.; Akezaki, Y.; Nakata, E.; Yamashita, N.; Tominaga, R.; Kurokawa, H.; Hamada, M.; Aogi, K.; Ohsumi, S.; Tsuji, T.; et al. Risk factors of impairment of shoulder function after axillary dissection for breast cancer. *Support Care Cancer* **2021**, *29*, 771–778. [CrossRef] [PubMed]
34. Paolucci, T.; Bernetti, A.; Paoloni, M.; Capobianco, S.V.; Bai, A.V.; Lai, C.; Pierro, L.; Rotundi, M.; Damiani, C.; Santilli, V.; et al. Therapeutic alliance in a single versus group rehabilitative setting after breast cancer surgery: Psychological profile and performance rehabilitation. *Biores Open Access* **2019**, *8*, 101–110. [CrossRef] [PubMed]
35. What Can Exercise Do? [Internet]. Available online: <https://www.acsm.org/docs/default-source/files-for-resource-library/cancer-infographic-sept-2022.pdf> (accessed on 2 June 2024).
36. Knaut, L.A.; Moser, A.D.; Melo, S.D.; Richards, R.R. Tradução e adaptação cultural à língua portuguesa do American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) para avaliação da função do ombro. *Rev. Bras. De Reumatol.* **2010**, *50*, 176–183. [CrossRef] [PubMed]
37. Angst, F.; Schwyzer, H.-K.; Aeschlimann, A.; Simmen, B.R.; Goldhahn, J. Measures of adult shoulder function: Disabilities of the arm, shoulder, and hand questionnaire (DASH) and its short version (QuickDASH), shoulder pain and disability index (SPADI), American shoulder and elbow surgeons (ASES) society standardized shoulder assessment form, constant (Murley) score (CS), simple shoulder test (SST), oxford shoulder score (OSS), shoulder disability questionnaire (SDQ), and Western Ontario shoulder instability index (WOSI). *Arthritis Care Res.* **2011**, *63*, S174–S188. [CrossRef]
38. Santos, J.; Gonçalves, R.S. Adaptação e validação cultural da versão portuguesa do Disabilities of the Arm Shoulder and Hand-DASH. *Rev. Portuguesa de Ortopedia e Traumatol.* **2006**, *14*, 29–44. Available online: <http://rimas.uc.pt/instrumentos/13/> (accessed on 2 June 2024).
39. Ruivo, R.M.; Pezarat-Correia, P.; Carita, A.I. Portuguese version of the American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES). *RPOT* **2015**, *23*, 288–297.
40. Angst, F.; Pap, G.; Mannion, A.F.; Herren, D.B.; Aeschlimann, A.; Schwyzer, H.K.; Simmen, B.R. Comprehensive assessment of clinical outcome and quality of life after total shoulder arthroplasty: Usefulness and validity of subjective outcome measures. *Arthritis Care Res.* **2004**, *51*, 819–828. [CrossRef]
41. Questionnaires [Internet]. EORTC–Quality of Life. 2017. Available online: https://qol.eortc.org/questionnaires/?search_category=Core (accessed on 16 October 2023).
42. Core-EORTC–Quality of Life: EORTC–Quality of Life [Internet]. qol.eortc.org. 2017. Available online: <https://qol.eortc.org/core/> (accessed on 2 June 2024).
43. Letellier, M.-E.; Dawes, D.; Mayo, N. Content verification of the EORTC QLQ-C30/EORTC QLQ-BR23 with the International Classification of Functioning, Disability and Health. *Qual. Life Res.* **2015**, *24*, 757–768. [CrossRef]
44. Pais-Ribeiro, J.; Pinto, C.; Santos, C. Validation study of the portuguese version of the QLCC30-V. 3. *Psicol. Saúde e Doenças* **2008**, *9*, 89–102.
45. Fayers, P.; Aaronson, N.; Bjordal, K.; Groenvold, M.; Curran, D.; Bottomley, A. *EORTC QLQ-C30 Scoring Manual*, 3rd ed.; European Organisation for Research and Treatment of Cancer: Brussels, Belgium, 2001.
46. Michels, F.A.; Latorre, M.R.; Maciel, M.S. Validity, reliability and understanding of the EORTC-C30 and EORTC-BR23, quality of life questionnaires specific for breast cancer. *Rev. Brasileira de Epidemiol.* **2013**, *16*, 352–363. [CrossRef] [PubMed]

47. Rebelo, V.; Rolim, L.; Carqueija, E.; Ferreira, S. Avaliação da qualidade de vida em mulheres com cancro da mama: Um estudo exploratório com 60 mulheres portuguesas. *Psicol. Saúde e Doenças* **2007**, *8*, 13–32.
48. Breast Cancer (Update of QLQ-BR23) [Internet]. EORTC–Quality of Life. Available online: <https://qol.eortc.org/questionnaire/update-qlq-br23/> (accessed on 2 June 2024).

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