

Effectiveness of Exercises without Restriction of Shoulder Range of Movement in the Postoperative Basis of Breast Cancer: Systematic Literature Review

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Efetividade dos Exercícios sem Restrição de Amplitude de Movimento de Ombro no Pós-operatório de Câncer de Mama: Revisão Sistemática da Literatura

Efectividad de los Ejercicios sin Restricción de la Amplitud de Movimiento del Hombro en el Postoperatorio del Cáncer de Mama: Revisión Sistemática de la Literatura

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ABSTRACT

Introduction: Breast cancer is the most common type of cancer in women worldwide. Since surgical approach is a treatment choice for breast cancer, in the postoperative, physiotherapeutic techniques can be used for rehabilitation, such as kinesiotherapy. **Objective:** To review the effectiveness of upper limb exercises in the postoperative period for breast cancer in improving range of motion and function of the upper limbs, gaining muscle strength and the appearance of seroma. **Method:** Review of randomized clinical trials that evaluated the effects of an exercise program on range of motion, muscle strength, upper limb function and seroma in the arm and breast ipsilateral to breast cancer surgery in female participants. **Results:** 284 studies were found in the databases, after eligibility, five studies were included in this review. Three articles evaluated range of motion, two evaluated the incidence of seroma, two articles evaluated the function of the upper limbs and one article the strength of the upper limbs. **Conclusion:** Performing an immediate intervention in the postoperative of breast cancer gives patients a better range of movement to carry out their activities of daily living, while minimizing delays for adjuvant therapies. Starting the exercise program immediately on the postoperative period, either on the 1st or 15th day, or starting after removing stitches and drains, as previously protocolled, will have the same probability of seroma formation.

Key words: Breast Neoplasms/surgery; Physical Exercise; Range of Motion Articular; Muscle Strength; Seroma/surgery.

RESUMO

Introdução: O câncer de mama é o tipo de câncer mais incidente nas mulheres no mundo. Uma vez que a abordagem cirúrgica é uma escolha de tratamento para o câncer de mama, no pós-operatório, técnicas fisioterapêuticas podem ser empregadas para reabilitação, como a cinesioterapia. **Objetivo:** Revisar a efetividade de exercícios de membros superiores no pós-operatório de câncer de mama em relação à melhora de amplitude de movimento e função de membros superiores, ganho de força muscular e aparecimento de seroma. **Método:** Revisão de ensaios clínicos randomizados que avaliou os efeitos de um programa de exercícios sobre a amplitude de movimento, força muscular, função de membros superiores e seroma no braço e mama homolateral à cirurgia de câncer de mama em participantes do sexo feminino. **Resultados:** Foram encontrados 284 estudos nas bases de dados, dos quais cinco foram incluídos nesta revisão. Três artigos avaliaram a amplitude de movimento, dois, a incidência de seroma, outros dois, a função de membros superiores e um artigo, a força de membros superiores. **Conclusão:** Realizar uma intervenção imediata no pós-operatório de câncer de mama confere aos pacientes uma melhor amplitude de movimento para realização de suas atividades de vida diária e minimiza atrasos para as terapias adjuvantes. Iniciar o programa de exercícios no pós-operatório imediato, tanto no 1º ou 15º dia, quanto iniciar após a retirada de pontos e drenos, conforme previamente protocolado, terá a mesma probabilidade para formação de seroma.

Palavras-chave: Neoplasias da Mama/cirurgia; Exercício Físico; Amplitude de Movimento Articular; Força Muscular; Seroma/cirurgia.

RESUMEN

Introducción: El cáncer de mama es el tipo de cáncer más común en las mujeres a nivel mundial. Dado que el enfoque quirúrgico es una opción de tratamiento para el cáncer de mama, en el posoperatorio se pueden utilizar técnicas fisioterapêuticas para la rehabilitación, como la kinesioterapia. **Objetivo:** Revisar la efectividad de los ejercicios de miembros superiores en el posoperatorio de cáncer de mama para mejorar la amplitud de movimiento y función de los miembros superiores, ganar fuerza muscular y la aparición de seroma. **Método:** Revisión de ensayos clínicos aleatorios que evaluaron los efectos de un programa de ejercicios sobre la amplitud de movimiento, la fuerza muscular, la función de las extremidades superiores y el seroma en el brazo y la mama ipsilateral a la cirugía de cáncer de mama en participantes femeninas. **Resultados:** Se encontraron 284 estudios en las bases de datos, después de la elegibilidad, se incluyeron cinco estudios en esta revisión. Tres artículos evaluaron la amplitud de movimiento, dos evaluaron la incidencia de seroma, dos artículos evaluaron la función de los miembros superiores y un artículo la fuerza de los miembros superiores. **Conclusión:** Realizar una intervención inmediata en el posoperatorio del cáncer de mama brinda a las pacientes una mejor amplitud de movimiento para realizar sus actividades cotidianas, minimizando retrasos para terapias adjuvantes. Iniciar el programa de ejercicio inmediatamente después de la operación, ya sea el día 1 o 15, o iniciarlo después de retirar puntos y drenajes, como se protocoló previamente, tendrá la misma probabilidad de formación de seroma.

Palabras clave: Neoplasias de la Mama/cirurgia; Ejercicio Físico; Rango del Movimiento Articular; Fuerza Muscular; Seroma/cirurgia.

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INTRODUCTION

Breast cancer is the most common type of cancer in women worldwide and ranks second in the list of most mortal cancers in the world¹. In Brazil, 74 thousand new breast cancer cases are estimated to be reported annually from 2023 to 2025². Despite the high numbers of incidence and mortality by breast cancer, the treatment possibilities are expanding in face of the technological and scientific advances, which reflects on the increase of successful treatments and survivals³.

Surgical approach is a treatment choice for breast cancer that is related to the increase in survival. Surgeries are classified as conserving and non-conserving and may trigger functional changes that impact in the quality of life of patients. Some of these impacts include pain, lymphedema, paresthesia, loss of muscle strength, scar retractions and decrease in range of motion (ROM) on the shoulder ipsilateral to surgery⁴.

Physiotherapy plays a key role in treating dysfunctions resulting from breast cancer, with the aim of minimizing or repairing the effects of surgeries. The physiotherapist's main objective is to rehabilitate the oncological patient, treat the musculoskeletal dysfunctions so they can resume their daily activities, thus improving their quality of life⁵.

Early rehabilitation minimizes delays in adjuvant therapies, such as radiotherapy, in which the patient must adopt a specific flexing posture with shoulder abduction. Physiotherapeutic techniques may be employed in the rehabilitation of breast cancer patients, including kinesiotherapy, a movement therapy aimed at rehabilitating the patients' functionality⁶.

The present study aims to increase the knowledge on the clinical practice and offer more confidence to physiotherapists when prescribing postoperative mastectomy exercise. Thus, the aim of this study is to review the effectiveness of upper limb exercises (UL), with no restriction of ROM of shoulder at 90°, compared to exercises with restriction or that were not initiated early in the breast cancer postoperative period. Moreover, it aims at assessing improvement of the UL function, muscle strength gain, if there are greater postoperative repercussions when the 90° movement is not limited, and the emergence of seroma.

METHOD

The protocol for this systematic review was pre-recorded in the International Prospective Register of Systematic Reviews (PROSPERO)⁷, number CRD42021270451. The eligibility criteria were developed using the PICO

approach (Participants, Intervention, Comparison and Outcomes) (Chart 1).

Chart 1. Inclusion and exclusion criteria

Inclusion	Exclusion
Female participants	Studies that did not specify the sex of participants
Studies that evaluated the effects of a postoperative exercise program with the prescription of immediately performing exercises as opposed to the control groups that had ROM restriction or did not initiate exercises early	Studies that did not specify when the exercise program was performed (immediate or late postoperative)
Studies that evaluated range of motion, muscle strength, upper limb function and seroma in the arm and breast ipsilateral to surgery	Studies in which the participants had other conditions besides breast cancer
Randomized clinical trials published in English, Portuguese and Spanish	Participants with lymphedema or in treatment for lymphedema

The database research was performed in March 2022 using the Medical Subject Headings (MeSH) combinations, including pluralization and spelling variations of USA/United Kingdom English and suffixes/ prefixes: *Breast Cancer, Postoperative Period, Range of Motion, Articular, Exercise, Seroma, Muscle Strength, Motor activity, randomized controlled trial*. The following databases were the research sources: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Library, Physiotherapy Evidence Database, (PEDro) and PubMed (Chart 2).

The quality assessment of the studies included in this review was performed through the PEDro Scale⁸ (Chart 3), which is an exclusive database tool for studies that analyze the effectiveness of physiotherapy interventions. It is based on the Delphi list, developed by Verhagen et al.⁹, though it includes additional items (items 8 and 10 of the PEDro scale). The objective of the PEDro scale is to help PEDro database users regarding the methodological quality of randomized controlled studies, in addition to assessing if the study contains minimal statistical information to allow the interpretation of results¹⁰.

Chart 2. Truncations for database searches

Population	Intervention	Outcomes	Study design
("Neoplasm cancer" OR "Breast Cancer" OR "Breast Carcinoma*" OR "Breast Malignant" OR Neoplasm OR "Breast Malignant Neoplasms" OR "Breast Malignant Tumor*" OR "Breast Neoplasm" OR "Breast Tumor*" OR "Cancer of Breast" OR "Cancer of the Breast" OR "Cancer Breast" OR "Cancer* Mammary" OR "Carcinoma* Breast" OR "Carcinoma* Human Mammary" OR "Human Mammary Carcinoma*" OR "Human Mammary Neoplasm*" OR "Malignant Neoplasm of Breast" OR "Malignant Tumor of Breast" OR "Mammary Cancer*" OR "Mammary Carcinoma* Human" OR "Mammary Neoplasm* Human" OR "Neoplasm* Breast" OR "Neoplasm* Human Mammary" OR "Tumor* Breast") AND ("Postoperative Period*" OR "Period* Postoperative")	(Exercise* OR "Activity* Physical" OR "Acute Exercise*" OR "Aerobic Exercise*" OR "Exercise Training*" OR "Exercise* Acute" OR "Exercise* Aerobic" OR "Exercise* Isometric" OR "Exercise* Physical" OR "Isometric Exercise*" OR "Physical Activity*" OR "Physical Exercise*" OR "Training* Exercise")	(seroma* OR "Range of Motion Articular" OR "Flexibility Joint" OR "Joint Flexibility" OR "Joint Range of Motion" OR "Passive Range of Motion" OR "Range of Motion" OR "Muscle Strength" OR "Strength Muscle" OR "Arthrogenic Muscle Inhibition*" OR "Inhibition Arthrogenic Muscle" OR "Muscle Inhibition Arthrogenic" OR "Motor function" OR "Motor Activity*" OR "Activity*, Motor")	("randomized controlled trial" OR "controlled clinical trial" OR "comparative study" OR "clinical trial" OR randomized OR randomly OR trial OR groups)

RESULTS

The database search resulted in the identification of 284 studies with analysis of 48 full text articles, the exclusion of 43, and final inclusion of five (Figure 1¹¹). Among the studies, two articles were published between 1990 and 2008 and three in 2020. In the evaluated articles, it was verified that more than one outcome studied in the present research was found in the same article.

The selection of studies was performed independently by two reviewers (CA, MP) and third reviewer (KP) solved all the divergences. After article selection, the data was extracted and described in Table 1. The quality assessment of studies included in this review was performed using the PEDro scale (Chart 3).

DISCUSSION

Women that have been submitted to surgical treatment for breast cancer may perform upper limbs (UL) exercises

with the aim of improving range of motion (ROM), muscle strength, UL function without the occurrence of seroma. In the present study, three articles assessed ROM^{12,14,15}, two the incidence of seroma^{15,16}, two UL function^{12,14} and, finally, one article, UL strength¹⁴.

Seroma is a serous liquid originating from an exudative process (typical of the inflammatory phase of the healing process) that accumulates in the dead spaces after closing the surgical wound. It's associated to several risk factors, like obesity, age, body mass index (BMI), type and duration of surgery, neoadjuvant treatments, size of tumor, amount of intraoperative blood loss and duration of drainage^{17,18}. In addition to shoulder immobility, described as a seroma preventing factor, some studies from 1997 to 2007 indicate that the immediate start of exercise in the first postoperative day results in a greater incidence of seroma formation, with significant differences when compared to the late start¹⁷⁻²⁰.

However, in the present study, most of the literature reviewed shows that women with breast cancer that



Chart 3. PEDro scale

	Author(s) and year				
	Cinar, Seckin, Keskin, et al. (2008) ¹²	Jansen, van Groot, Rottier, et al. (1990) ¹³	Majed, Neimi, Youssef, et al. (2020) ¹⁴	Rizzi, Haddad, Giron, et al. (2020) ¹⁵	Teodózio, Marchito, Fabro, et al. (2020) ¹⁶
Specified eligibility (yes/no)	No	Yes	Yes	Yes	Yes
Randomized allocation (0-1)	1	1	1	1	1
Blind allocation (0-1)	0	0	0	0	1
Homogeneity in groups (0-1)	1	0	1	0	1
Blind subjects (0-1)	0	0	0	0	0
Blind physiotherapists (0-1)	1	0	0	0	0
Blind assessors (0-1)	0	0	0	0	0
85% follow-up (0-1)	1	1	0	1	1
Intention of treatment (0-1)	0	1	1	1	1
Intergroup comparisons (0-1)	0	0	0	1	1
Variability and precision measures	1	1	1	1	1
Total PEDro scale (0-10)	5	4	4	5	7

Note: PEDro scale score: external validity (item 1); bias risk assessment (items 2-9); statistical description (items 10 and 11).

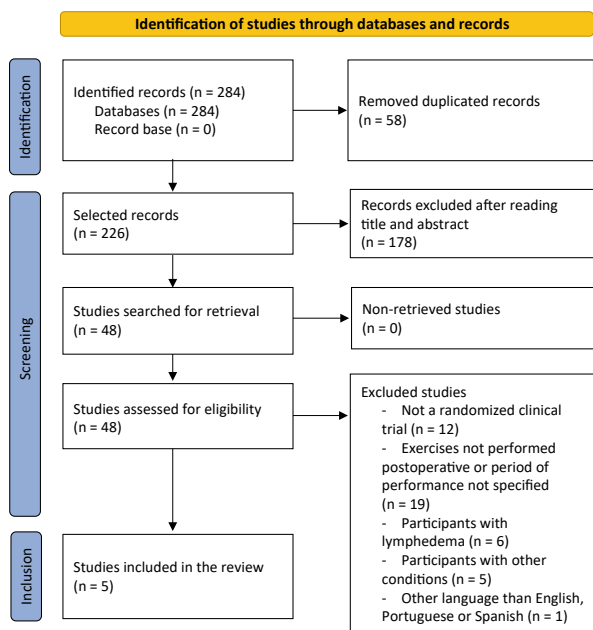


Figure 1. Flowchart

Source: PRISMA¹¹

started an exercise program for shoulder mobility in the first postoperative day showed significant improvements to shoulder-arm mobility (UL function), strength and ROM improvement, in comparison to those who did not perform. Upon assessing the complications of the surgical wound, including seroma, Teodózio et al.¹⁶ did not observe statistically significant difference among the groups for

any of the outcomes assessed by the study ($p > 0.05$). The study compared 461 women divided in an intervention group with free exercises since the first postoperative day and a group restricted to 90°¹⁶. Rizzi et al.¹⁵, on the other hand, decided to compare the two groups only 15 days after the postoperative period, before that, the two groups remained with ROM limited to 90°, with a sample of 60 women, and also did not show significant difference among the groups¹⁵. Jansen et al.¹³, with a sample of 144 women, observed that patients in the control group had 14% less wound drainage volume (600 ± 436 ml vs. 701 ± 398 ml) than patients in the intervention group, but this difference was not statistically significant¹³.

The articles that assessed seroma did not observe significant difference among the groups regarding seroma incidence. Jansen et al.¹⁶ assessed the presence of seroma through inspection and palpation and if there was a need for puncture, and the study by Rizzi et al.¹⁵ through the volume of drains.

Studies have shown that exercise can be started at the first postoperative day, without the need for restriction of shoulder movement at 90°, considering that, in most studies, the incidence of seroma showed no significant difference among the restricted or free ROM groups. Thus, the other factors that influence the emergence of seroma can be more related to its incidence in breast cancer postoperative periods than in free range shoulder mobility exercises. It is worth mentioning that all studies



Table 1. Data extraction

Author(s), year	Sample (n = age in years)	Surgery type (%)	Intervention group (IG)	Control group (CG)	Results evaluation	Results
Cinar, Seckin, Keskin, et al. (2008) ¹²	n = 57 IG; n = 27; (52.6 ± 12.2) CG: n = 30; (51.1 ± 13)	Modified radical mastectomy (100%)	In the first postoperative day, the shoulder was positioned at a 65° flex, 45° to 64° abduction and 65° internal rotation in a wedge pillow, with the performance of active ROM exercises of hand and elbow under supervision of a physiotherapist. In the second postoperative day, isometric hand and forearm exercises were initiated. In the third and fourth days were performed assisted active and active flexion exercises, abduction and external and internal shoulder articulation ROM. Passive stretch exercises were performed in the following days; after drain removal, the group received 15 individual sessions of physiotherapy. Home exercises were performed in the 8 following weeks	After drain removal, the group received a form to perform the exercises at home. The forms were detailed, showing and explaining the exercises	Shoulder ROM on the operated side was measured by Myrin goniometry. To assess the upper limb function, a questionnaire was applied with questions about functional tasks ¹⁵	Differences throughout time in the flexion, abduction and adduction movements were significantly better in IG compared to CG ($p < 0.01$, $p < 0.001$, $p < 0.005$, respectively). Average flexion and abduction ROMs returned to values close to those before surgery more quickly in the IG when compared to the CG; the score of the upper limbs function questionnaire was significantly better in the IG when compared to the CG ($p < 0.05$). In the IG, the functional questionnaire score in the sixth follow-up month was lower than the basal, indicating that patients presented better upper limb function compared to the pre-operative period
Jansen, van Groot, Rottier, et al. (1990) ¹³	n = 144 IG: n = 78 CG: n = 66 average age 59.2 years old	Modified radical mastectomy (70.14%); axillary lymph node dissection (26.39%) or no lumpectomy (3.47%)	Active shoulder exercises on the first postoperative day, movements performed under supervision of a physiotherapist up to the pain barrier (flexion, abduction, horizontal abduction and external rotation)	Arm immobilized in the Collar'n 'Cuff sling in the first 7 days when out of the bed and, when in bed, the arm rested on a pillow, wrist and hand movements allowed; shoulder exercises from the eighth postoperative day under supervision of a physiotherapist up to the pain barrier	Shoulder function was measured by one or two physiotherapists (flexion, horizontal abduction and external rotation); wound drainage output from both drains was recorded in a diary. Drains were removed when the output was inferior to 30 ml/24 hours in 2 consecutive days, with no signs of drain obstruction. In the 14th postoperative day, all drains were removed regardless of their output	Seroma: CG patients had 14% less wound drainage volume (600 ± 436 ml vs. 701 ± 398 ml) than IG patients, but this difference was not statistically significant; all the shoulder functions were slightly reduced 6 months after the surgery. Abduction was reduced in 7.7 ± 1.4° and flexion by 7.7 ± 1.1°. Horizontal abduction, external rotation with the humerus in neutral position and external rotation with abducted humerus were all reduced in less than 2° when compared to the contralateral side

to be continued



Table 1. continuation

Author(s), year	Sample (n = age in years)	Surgery type (%)	Intervention group (IG)	Control group (CG)	Results evaluation	Results
Majed, Neimi, Youssef, et al. (2020) ¹⁴	n = 60 IG: 30 CG: 30 Average age: 35 and 42 years-old	Modified radical mastectomy (100%)	The IG received pre-surgical education and training on therapeutic exercises in addition to routine hospital care. The patients were instructed to perform 10 repetitions of each exercise during hospitalization, with greater guidance in the outpatient follow-up appointment. Shoulder flexion was limited to 90° ROM during the first days after surgery and until the drains were removed, and increased gradually after the third postoperative day	CG received routine hospital care that did not include any physical training or education	ROM assessment through goniometry and quality of life instrument, QoL-BC, patient self-report scale that assesses the concerns of cancer survivors	ROM: significant differences in the second and fourth postoperative week; flexion in the second week was 133.80 ± 6.79 for IG and 131.17 ± 2.20 for CG ($p = 0.04$); flexion in the fourth week was 167.97 ± 4.09 for IG and 159.92 ± 1.73 for CG ($p < 0.001$); the extension improved significantly for IG in two weeks with average 42.77 ± 2.30 vs. 38.73 ± 1.46 , $p < 0.001$; and in four weeks 53.07 ± 2.12 vs. 49.03 ± 1.25 , $p < 0.001$; abduction showed significant difference among IG and CG, in two weeks 143.50 ± 4.42 vs. 138.57 ± 1.78 , $p < 0.001$; and in four weeks 167.03 ± 4.61 vs. 159.40 ± 1.69 , $p < 0.001$
Rizzi, Haddad, Giron, et al. (2020) ¹⁵	n = 60 IG: n = 30; 55.06 CG: n = 30; 52.53	Oncoplastic conserving surgery; quadrantectomy (91.6%); margin re-excision (8.3%) and collateral symmetrization (100%)	Fifteen days after surgery: Free ROM group: patients allowed in this moment to perform protocolized exercises and daily life activities in free range, that is, until they felt pain or stretching sensation. Free ROM guidance was kept even in the presence of scarring complications	Fifteen days after surgery: Limited ROM group (control): patients guided not to lift the upper limbs beyond shoulder height. Limited ROM maintenance at 90° for over 15 days, that is, until the 30th postoperative day	Active flex ROM, extension, adduction, abduction and internal and external rotation of the shoulder ipsilateral to oncological surgery was assessed with a goniometer. Pain was assessed by verbal analogue scale (VAS). The patient was asked about pain at the time of assessment regarding the breast surgery, armpit and ipsilateral upper limb. The motor function of the upper limb was assessed by the DASH questionnaire (the greater the score, the worse the function). Dehiscence, seroma, infection and necrosis were assessed through inspection and/or palpation	There was no significant statistical difference in the postoperative complications among the groups, whether in incidence or prevalence throughout time. Variance analysis of the study did not show difference in the upper limb among the groups during follow-up, but the intra-group assessment showed that the limited ROM group had significantly higher scores in the DASH questionnaire in the 30th postoperative day than in the pre-operative assessment. There was no significant difference among the groups regarding shoulder ROM changes

to be continued



Table 1. continuation

Author(s), year	Sample (n = age in years)	Surgery type (%)	Intervention group (IG)	Control group (CG)	Results evaluation	Results
Teodózio, Marchito, Fabro, et al. (2020) ¹⁶	n = 461 FROM: n = 252; 54.54(± 12.03) RROM: n = 209; 54.53(± 10.95)	56.8% were submitted to simple or modified radical mastectomy and 46.5% to axillary lymphadenectomy	Free ROM group (FROM), that performed active upper limb movements with ROM superior to 90° for flexion and shoulder abduction from the 1st postoperative day	Restricted ROM group (RROM), that performed active upper limb movements with ROM restricted to 90° from the 1st postoperative day until the removal of all surgical stitches	The evaluated outcomes were the presence of seroma (floating of the residual plastron, breast or axilla, requiring aspiration > 50 ml)	After follow-up, 63.8% of patients presented some complication in the surgical wound, with necrosis (39.3%) and seroma (30.8%) being the most frequent. No statistically significant difference was observed among the groups for none of the assessed outcomes ($p > 0.05$) when evaluating the incidence of surgical wound complications according to the intervention group. Those results were kept even after adjustment for age, type of surgery and axillary approach. No difference was observed in the incidence of surgical wound complications between the two intervention groups when stratifying the data by type of surgery or axillary approach

Captions: ROM = range of motion; FROM = Free range of motion group; RROM = Restricted range of motion group; IG = Intervention group; CG = Control group; QoL-BC = Quality of Life Instrument – Breast Cancer Patient Version; DASH = Disabilities of the Arm, Shoulder and Hand.

verified the presence of seroma or dehiscence during the study, and if any of those were present, the patients were guided to continue the exercises, but limited to 90° ROM, according to Bergmann et al.²¹.

For the evaluation of ROM, studies were performed using goniometry^{12,14,15}. In Cinar et al.¹², differences throughout time in the flexion, abduction and adduction movements were significantly better in the intervention group compared to the control group ($p < 0.01$, $p < 0.001$, $p < 0.005$, respectively). The mean amplitudes of flexion and abduction returned to preoperative values closer to the previous ones more quickly in the intervention group compared to the control group¹². In Majed et al.¹⁴, there were significant differences in the second and fourth weeks after surgery. Flexion in two weeks for the intervention group was greater than the control group ($p = 0.04$). Just as in Rizzi et al.¹⁵, who also found no difference among the groups regarding the changes in shoulder ROM¹⁵. Of the articles that assessed ROM as an outcome, all of them noticed greater ROM gain in the intervention group with two studies that did not show significant differences among the groups^{12,14,15}. Thus, performing an immediate intervention in postoperative breast cancer gives patients a better range of movement to carry out their activities of daily living, while minimizing delays for adjuvant therapies.

To Cinar et al.¹², recovery of upper extremity functional questionnaire scores was also significantly better in the intervention group compared to the control group ($p < 0.05$). In the intervention group, the functional questionnaire score in the sixth follow-up month was lower than the basal, indicating that patients presented better upper limb function compared to the pre-operative period. The Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire was also used in the study by Rizzi et al.¹⁵, and the variance analysis of the study did not show difference in the upper limb function among the groups during follow-up¹¹. Regarding upper limb function, an article described a significant difference among the groups in which the intervention presented improvement regarding this outcome, against a study that did not observe a significant difference among the compared groups. The discrepancy among the instruments used in the two articles should be considered.

The potential biases for the study that may be considered are heterogeneity of the tested exercise programs; the diversity of instruments used for assessing each outcome; adequate blinding of participants allocation, at least from the therapists that performed the assessments; and lack of information on the bias risk



assessment in some studies. The difference in surgical approach between participants in each study may also be a limiting factor for more reliable results.

In line with the results of this study, Cochrane's review in 2010, which included 24 studies involving 2,132 women with breast cancer, examined the effect of early vs. late implementation of postoperative exercise. Such study concluded that early exercise was more effective than late exercise in clinical and statistical significance on ROM. The authors recommended more research that closely monitor the frequency and intensity of exercise programs²². In Yang et al.²³, a recent 2018 systematic review of six studies, including two randomized clinical trials, concluded that training programs for patients submitted to breast cancer surgery may reduce pain and improve functional recovery, especially in increasing shoulder ROM²².

CONCLUSION

Women that have been submitted to surgical treatment for breast cancer may perform upper limbs (UL) exercises to improve range of motion (ROM), muscle strength, UL function without the formation of seroma. Performing an immediate intervention in postoperative breast cancer gives patients a better range of movement to carry out their activities of daily living, while minimizing delays for adjuvant therapies. Starting the exercise program immediately on the postoperative period, either on the 1st or 15th day, or starting after removing stitches and drains, as previously protocolled, will have the same probability of seroma formation. New studies should be performed to measure what other factors are related to seroma occurrence.

CONTRIBUTIONS

All the authors have substantially contributed to the study design, acquisition, analysis and interpretation of the data, wording, and critical review. They approved the final version for publication.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interest to declare.

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