

Factors related to the recovery of functional capacity in women with breast cancer: systematic review

Factores relacionados con la recuperación de la capacidad funcional en mujeres con cáncer de mama: revisión sistemática

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Abstract

The objective of this review was to consolidate the available evidence about the factors related to the recovery of functional capacity (FC) in women with breast cancer, based the PRISMA declaration criteria. The quality of the studies was assessed using the New Castle Ottawa and JADAD scales. 11 studies were included: seven experimental and four cohort follow-ups. Psychological, clinical, and treatment factors related to FC recovery, were identified. However, some results come from studies with low methodological quality. Additionally, the findings are not comparable because they were evaluated using different instruments. In conclusion, the recovery of FC to require considering individual and interventions factors, as psychological well-being and early rehabilitation. Is necessary to standardize the instruments to evaluate FC in women with breast cancer, and to increase the quality of the research about this topic.

Key words: breast neoplasms; functional capacity; rehabilitation; physical exercise; recovery of function.

Resumen

El objetivo de esta revisión fue consolidar la evidencia disponible sobre los factores relacionados con la recuperación de la capacidad funcional (CF) en mujeres con cáncer de mama de acuerdo a los criterios de la declaración de PRISMA. La calidad de los estudios se evaluó utilizando las escalas New Castle Ottawa y JADAD. Se incluyeron 11 estudios: 7 experimentales y 4 seguimientos de cohortes. Identificamos factores psicológicos, clínicos y de tratamiento relacionados con la recuperación de CF, sin embargo, algunos resultados provienen de estudios con baja calidad metodológica. Además, los resultados no son comparables, porque fueron evaluados utilizando diferentes instrumentos. En conclusión, la recuperación de la FC requiere considerar factores individuales y de intervención, como el bienestar psicológico y la rehabilitación temprana, pero es necesario estandarizar los instrumentos para evaluar la CF en mujeres con cáncer de mama y aumentar la calidad de la investigación sobre este tema.

Palabras clave: neoplasias de la mama, capacidad funcional, rehabilitación, ejercicio físico, recuperación de la función.

Introduction

The International Classification of Functioning, Disability and Health (ICF) states that to achieve the participation of an individual in society, not only functions and structures without deficiencies are required, but also the absence of limitations for the development of activities (World Health Organization, 2001).

Regarding the capability to develop activities, the term Functional Capacity (FC) is widely used, and it may globally describe the ability of an individual to carry out various activities. However, it can also be used to describe said ability in relation to certain specific dominions of functioning; physical functioning (the degree of motor development that allows for the development of the activity), mental functioning (the cognitive ability to understand the sequence of steps), emotional functioning (the desire to do the activity), and social functioning (that the activity allows for interaction). Additionally, it is also used to refer to specific abilities, for example, in relation with cardiopulmonary capacity during physical activity (Leite et al., 2015; Parry et al., 2017).

In the field of physical rehabilitation, given the variety of activities an individual can develop, day-to-day activities are especially important, those the person carries out around basic functions like getting dressed or eating. As a result, the use of the term FC to describe the highest degree of independence and autonomy with which activities of daily living (ADL) and instrumental activities of daily living (IADL) are performed is common (Leite et al., 2015; Parry et al., 2017; Sehl et al., 2013; Zomkowski et al., 2018). This capability may be evaluated directly (objectively) by observing and measuring when the subject follows certain instructions (Derks et al., 2016; Parry et al., 2017; Pruitt et al., 2012), or indirectly (subjectively) from what the patient reports (Letellier & Mayo, 2017).

There are certain pathologies that are likely to deteriorate this FC, be it as a result of changes due to the pathology, at a structural or functional level and which subsequently limit the development of activities, or as a side effect of the treatments they have to undergo. One of the pathologies where this deterioration has been described is breast cancer, in which both of the described deterioration sources apply (Elias et al., 2015; Khan, Amatya, Pallant, & Rajapaksa, 2012; Ramachandran et al., 2018).

In women with breast cancer, deterioration of FC can be associated with loss of muscle mass, loss of body fat, decrease in muscle strength and flexibility (Reis et al., 2018). After chemotherapy, radiotherapy and

breast surgery, it may appear; upper limb dysfunction (McNeely et al., 2010), with pain in the chest and arm (Hamood et al., 2018; Uclés Villalobos et al., 2017; Zomkowski et al., 2018), paresthesias (Hamood et al., 2018; Uclés Villalobos et al., 2017), allodynia (Hamood et al., 2018), fatigue (Garabeli Cavalli Kluthcovsky et al., 2012; Zomkowski et al., 2018), loss of bone density (Runowicz et al., 2015), in addition to the appearance of lymphedema in the upper extremities (Khan, Amatya, Pallant, & Rajapaksa, 2012), which in turn generates pain, inflammation, loss of muscle strength, loss of flexibility and decreased mobility (Elias et al., 2015; McNeely et al., 2010; Preston et al., 2004; Ramachandran et al., 2018). All these changes in upper limb dysfunction secondary to treatment (decrease in AMA, strength, appearance of pain and lymphedema) (McNeely et al., 2010). All these changes added to the affection at the cognitive, psychological and social interaction level (Lahart et al., 2018; Ramachandran et al., 2018; Runowicz et al., 2015); they favor the loss of independence and autonomy for the development of activities of daily living (Costa et al., 2017; Elias et al., 2015) and this in turn is related to a decrease in labor productivity, increased time to return to work (Zomkowski et al., 2018), higher morbidity mortality and lower survival (Braithwaite et al., 2010; Marinac et al., 2014; Sehl et al., 2013).

Some studies have explored those factors that favour the deterioration of FC, such as age (Braithwaite et al., 2010; Derks et al., 2016; Henríquez & de Vries, 2017; Matos-Duarte et al., 2017), body mass index (BMI), educational level (Braithwaite et al., 2010; Sehl et al., 2013), comorbidities, tumour stage (Braithwaite et al., 2010), and health care time (more time, more deterioration) (Hoffner et al., 2017; Markes et al., 2007; Sánchez, 2013). These researches have helped identify populations or conditions that may be intervened as a preventive measure. Nevertheless, there is no consolidated scientific evidence that shows which factors aid for the recovery of FC once it is lost, which is necessary to support the areas of health care in charge of rehabilitation processes, and which, in the best case scenario, aim at recovering the lost functions and abilities, so that the individual can finally participate in society again (Bogotá: Fondo Colombiano de Enfermedades de Alto Costo, 2016; Garabeli Cavalli Kluthcovsky et al., 2012; Hamood et al., 2018; Parry et al., 2017). In any case, when measuring FC, it is very important to define from which approach the assessment is being made; in relation to physical functioning (degree of motor development), mental functioning (cognitive development), emotional functioning (the desire to perform the activity), social

Table 1. Search strategy for the systematic review.

In English
(((((breast neoplasms) OR breast cancer)) AND ((((((risk factors) OR protective factors) OR epidemiological factors) OR cultural factors) OR residence characteristics) OR time factors) OR age factors)) AND (((rehabilitation) OR recovery of Function) OR recovery)) AND (((functional capacity) OR Physical functioning) OR Independence) OR Personal Autonomy) OR Activities of Daily Living)) AND (((epidemiological studies) OR clinical trial) OR Follow-Up Studies)) NOT ovarian function

functioning (that the activity allows interaction). Some authors even mention a comprehensive assessment through the objective assessment of activities that involve elements of general functioning (Derks et al., 2016; Parry et al., 2017; Pruitt et al., 2012) or as a subjective assessment; from what the patient perceives (Letellier & Mayo, 2017).

The objective of this systematic review was to consolidate the available evidence regarding the factors related to the recovery of FC involved in day-to-day activities in population with breast cancer.

Methodology

Information sources

Scientific literature was searched in the Medline, Embase, Web of science, PEDro, and Cochrane databases, until September 22, 2018. Referenced documents within the identified articles in those databases, were also included. The recommendations of the PRISMA guide to carry out systematic reviews, were followed.

Based on the research question: ¿which are the factors related to the recovery of functional capacity in women with breast cancer?, the search keywords were selected; in Spanish using the Health Sciences Descriptors (DeCS, in Spanish), and in English using the Medical Subject Headings (MeSH). The terms (non-DeCS/MeSH) breast cancer, functional capacity, and physical functioning, were added, because they were deemed important to achieve the objective of this review. Table 1 shows the established search strategy using Boolean operators.

For the selection of the articles, the following inclusion criteria were considered: a) studies done in women with breast cancer in any stage; b) case-control, cohort, cohort follow-up, and clinical trial epidemiologic studies; c) studies that considered recovery of independence and autonomy for the development of activities of daily living and/or instrumental activities of daily living as dependent variables; and d) studies published in Spanish, English, and Portuguese. Were excluded: a) descriptive studies (case studies, series of cases, and diagnostic test studies), b) letters to

the editor, and c) epidemiologic studies that stated FC as a dependent variable, but actually explored other outcomes, such as physical activity frequency, sport, quality of life (as a total score, without discriminating by dominion), cardiopulmonary function, joint movement range, or muscle strength. The search was not limited by year of publication.

Selection and extraction of the information in the articles

The selection of the studies was done in two phases. During the first phase, two researchers independently selected the articles based on the title and the abstract, taking into account the inclusion and exclusion criteria, and in those cases where an agreement was not reached, a third researcher defined the inclusion or exclusion of the article. The selected articles were stored in an initial database in Excel, which included the Digital Object Identifier (DOI), title, and database where it was found (the most complete, in case two versions were found).

During the second phase, the selected articles were completely explored to verify the compliance with the inclusion or exclusion criteria. After second review, those articles that definitely going to be included in the systematic review were selected, with these articles a new database was created which included: last name and initials of the first author, country/period of study, design, study population, sample size, instrument used to determine FC, cut-off point to determine FC recovery, association/relation/correlation measurements used, conclusion regarding the factors related to recovery in breast cancer, and variables studied as possible related factors, but whose result was not statistically significant.

Methodological quality evaluation

The studies selected for systematic review were evaluated for their methodological quality, by means of weighing using the New Castle Ottawa scale for epidemiological studies, and JADAD scale for clinical trials. The New Castle Ottawa scale was developed to evaluate the quality of non-randomized studies, assigning a maximum value of 8 that is divided in three dominions: selection process of the study groups, comparability of

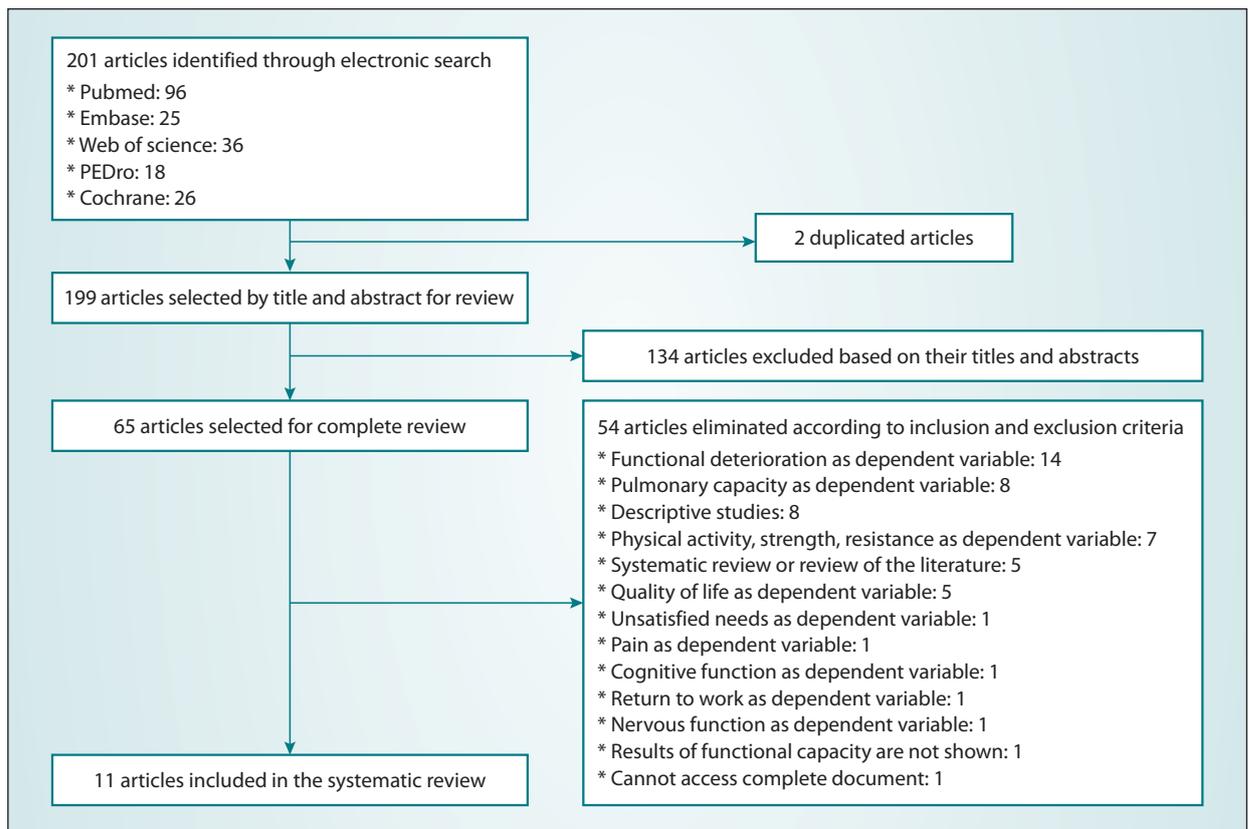


Figure 1. Selection process for including the studies in the systematic review.

the groups, and determination of the exposition or the outcome of interest for case-control or cohort studies, respectively (Lo et al., 2014; Wells et al., s. f.).

In this review, similar to what was done by Takahashi for transversal studies (Takahashi & Hashizume, 2014), a modification was made for cohort follow-up studies excluding the items; selection for the unexposed cohort and comparability of the groups. Thus, the highest possible score was 6 using the following scale: very good (5-6 points), good (4 points), satisfactory (3 points), and unsatisfactory (0-2 points). The JADAD scale has five questions related to the randomization process, the blinding, and the description of losses and withdrawals during follow-up; each question was assigned a score between 0 and 1, and later the scores were added to classify the methodological quality of the study as good (>3) or bad (≤ 2) (Berger, 2006; Jadad et al., 1996).

Results

After applying the search strategy, 201 articles were obtained. After the deletion of the duplicates, 199 remained for title and abstract review. During the first stage 134 articles was eliminated, obtaining 65 for a complete revision. In the second stage, 54

articles were deleted because they did not comply with the inclusion criteria or because among the expected outcomes, the outcome of interest (FC) was not included. Finally, 11 articles were included in the systematic review (figure 1).

Type of studies

From the selected studies, five were developed in the United States (Hodgson & Given, 2004; Levy et al., 2012; Ligibel et al., 2016; Vinokur et al., 1990; Wingate, 1985), two in Australia (Khan, Amatya, Pallant, & Rajapaksa, 2012; Khan, Amatya, Pallant, Rajapaksa, et al., 2012), two in Turkey (Cinar et al., 2008; Eyigor et al., 2010), one in Sweden (Lindquist et al., 2015), and one in Brazil (Oliveira et al., 2009), between 1985 and 2011. Six of the articles were reported as clinical trials (Cinar et al., 2008; Eyigor et al., 2010; Khan, Amatya, Pallant, Rajapaksa, et al., 2012; Ligibel et al., 2016; Lindquist et al., 2015; Oliveira et al., 2009), two as cohort follow-ups (Levy et al., 2012; Vinokur et al., 1990), and three of them did not clearly report the study design, but two were assumed to be cohort follow-ups (Hodgson & Given, 2004; Khan, Amatya, Pallant, & Rajapaksa, 2012), and an experimental study (Wingate, 1985).

Table 2. General characteristics of the studies included in the systematic review.

Author/ Publication year	Country/ Study period	Design	Population/Ages	Sample	Instrument	Criterion to determine recovery	Related factors**	Non-significant finding
Hodgson N * /2004 (Hodgson & Given, 2004)	USA/ 1993-1997	Undescribed (Cohort follow-up)	Surgical management patients: breast cancer (n=43), lung cancer, colon cancer, prostate cancer/65-98 years old	172	Physical function and physical role of the SF36 subscales	An increase of at least 10 points	Psychological wellbeing (+) More severe symptoms (-) Comorbidities (-)	Psychosocial wellbeing Unsatisfied needs
Khan F /2012 (Khan, Amatya, Pallant, & Rajapaksa, 2012)	Australia/ 2007-2011	Undescribed (Cohort follow-up)	Breast cancer survivors	85	FIM	It talks about recovery; it is not clear how it was determined	Receive chemotherapy (+) Upper limb weakness (-)	
Khan F /2012 (Khan, Amatya, Pallant, Rajapaksa, et al., 2012)	Australia/ 2007-2011	Clinical trial	Patients with breast cancer diagnosis/30-80 years old	43 T 42 C	FIM	Statistically significant change in the score		Outpatient rehabilitation treatment
Levy E /2012 (Levy et al., 2012)	USA/ 2001-2006	Cohort follow-up	Patients with recent breast cancer diagnosis/28-85 years old	166	ULDQ	Change from limitation to no limitation in each activity	Surgery in the dominant side (-) BMI higher than 25 (-) Pain, tiredness, weakness, numbness (-)	
Cinar N /2009 (Cinar et al., 2008)	Turkey/ Unreported	Clinical trial	Patients subjected to modified radical mastectomy	27 T 30 C	Wingate	No cut-off point	Early rehabilitation (+)	
Ligibel JA /2016 (Ligibel et al., 2016)	USA/ 2006-2011	Clinical trial	Women with metastatic breast cancer/Average age: 49 years	48 T 53 C	Functional component of the EORTC QLQ-C30	Statistically significant change in the score		Aerobic exercise based at home (16 weeks)
Oliveira MMF /2009 (Oliveira et al., 2009)	Brazil/ 2005-2006	Clinical trial	Patients who underwent breast surgery	32 T 34 C	Wingate	Without clear criterion		Shoulder exercises during radiotherapy
Eyigor S /2010 (Eyigor et al., 2010)	Turkey/ Unreported	Clinical trial	Patients with breast cancer diagnosis/18-75 years old	27 T 15 C	Functional component of the EORTC QLQ-C30 and the EORTC BR23	Statistically significant improvement in the total score	Intervention through Pilates exercises (+)	
Vinokur A /1990 (Vinokur et al., 1990)	USA/1985	Cohort follow-up	Patients recently diagnosed with breast cancer/40 years and older	274	Rosow and Bresslad	Statistically significant decrease in the total score	Advanced age (-) Greater extension of the surgery (-)	
Lindquist H /2015 (Lindquist et al., 2015)	Sweden/ Unreported	Clinical trial	Patients with secondary lymphedema after breast or gynaecological cancer	35 T1 29 T2 24 C	DASH	Without clear criterion	Exercises on the ground (vs. exercises in the water) (+)	
Wingate L /1985 (Wingate, 1985)	USA/ Unreported	Undescribed (Clinical trial)	Patients with mastectomy	49 T 41 C	Wingate	Without clear criterion	Physiotherapeutic treatment (+)	

T: Treatment, C: Control. FIM: Functional Independence Measure. LDQ: Upper-limb handicap questionnaire. Wingate: Functional questionnaire suggested by Wingate. Rossow and Bresslad: Difficulties in physical functioning: Questions about 10 activities suggested by Rossow and Bresslad. DASH: Questionnaire on the shoulder, elbow, and hand handicaps. *Only findings for breast cancer are included. **Factors related with FC recovery; positively (+), negatively (-).

Population

The population included in the study corresponded to women with breast cancer at different stages; three studies included women with breast cancer, independent of the stage (Eyigor et al., 2010; Khan, Amatya, Pallant, & Rajapaksa, 2012; Khan, Amatya, Pallant, Rajapaksa, et al., 2012). The studies by Levy E and Vinokur A, considered patients with breast cancer,

recently diagnosed (Levy et al., 2012; Vinokur et al., 1990). Ligibel JA included women with metastatic breast cancer (Ligibel et al., 2016). In the Linquist H clinical trial, patients with lymphedema secondary to breast or gynecological cancer were included (Lindquist et al., 2015). Four of the studies included participants after surgical treatment; Hodgson N included patients with surgical management, 43 of whom had breast cancer (Hodgson & Given, 2004), Oliveira MMF

Table 3. Methodological quality of the clinical trials included in the systematic review.

JADAD scale (clinical trials)	Points	Eyigor S	Khan F	Ligibel JA	Cinar N	Oliveira MMF	Linguist H	Wingate L
Was the study described as randomized?	Yes	1	1	1	1	1		
	No	0					0	0
Was the method used to generate the randomization sequence described and is it adequate?	Yes	1	1	1	1	1		
	No	0				0	0	0
Was the study described as double blind?	Yes	1						
	No	0	0	0	0	0	0	0
Was the blinding method described and is it adequate?	Yes	1		1				
	No	0	0		0	0	0	0
Was there a description of withdrawals and dropouts?	Yes	1	1	1	1	1	1	1
	No	0				0		
Total			3	4	3	1	3	1

indicated that its population was patients who received breast surgery (Oliveira et al., 2009), Wingate L; patients with mastectomy (Wingate, 1985), Cinar N; patients undergoing modified radical mastectomy (Cinar et al., 2008). The sample sizes for the observational studies were between 85 and 274 (table 2).

Methodological quality of the studies

When evaluating the methodological quality of the six studies declared clinical trials, the most were described as randomized (35,38–40,42) four of them described the randomization sequence, and it was deemed adequate by the researchers in this review (Eyigor et al., 2010; Khan, Amatya, Pallant, Rajapaksa, et al., 2012; Ligibel et al., 2016; Oliveira et al., 2009), none of the studies was described as a double blind and only one adequately described the blinding method (simple blind) (Khan, Amatya, Pallant, Rajapaksa, et al., 2012). Finally, five out of the six studies described the losses that occurred during follow-up (Eyigor et al., 2010; Khan, Amatya, Pallant, Rajapaksa, et al., 2012; Ligibel et al., 2016; Lindquist et al., 2015; Oliveira et al., 2009). With these results, the studies of Eyigor S (Eyigor et al., 2010), Khan F (Khan, Amatya, Pallant, Rajapaksa, et al., 2012), Ligibel JA (Ligibel et al., 2016) and Oliveira MMF (Oliveira et al., 2009), were considered to have good methodological quality. Wingate L's work (Wingate, 1985), was also taken as an experimental study even though it was not described by the author, and after evaluating it with JADAD, it was found that it is not described as randomized or blinded; nevertheless, it didn't report the losses during follow-up (table 3).

Although the researchers did not clearly report the representation level, when the methodological

quality of the four studies taken as cohort follow-ups was evaluated (Hodgson & Given, 2004; Khan, Amatya, Pallant, & Rajapaksa, 2012; Levy et al., 2012; Vinokur et al., 1990) with the New Castle Ottawa scale, Although the researchers do not clearly report the degree of representativeness, samples of the two studies were assumed as representative of the exposed population, given the fact that they are records taken from different oncologic centres at different times and with ample inclusion criteria (Hodgson & Given, 2004; Vinokur et al., 1990). The records about the exposition came from official sources (hospitals/clinics/population records) for the four studies. When exploring the items regarding the non-existence of the outcome (FC recovery) at the beginning of the study and if the measurement of the outcome is adequately done, three of them (Hodgson & Given, 2004; Levy et al., 2012; Vinokur et al., 1990) carried out a basal measurement, and additionally, the outcome is measured objectively; while in the study by Khan F. (Khan, Amatya, Pallant, Rajapaksa, et al., 2012), this talked about FC recovery without clearly establishing the previous state of that variable, and despite using the FIM scale, was the patient herself who determined it through a self-report.

Taking previous studies that consider follow-up periods of at least one-year to explore FC recovery as reference, only in Vinokur A's study this time might be insufficient (average of 10 months). This research did not report follow-up losses either, unlike the other three studies (Vinokur et al., 1990). From these results we could conclude that two studies were deemed to have very good quality (Hodgson & Given, 2004; Levy et al., 2012), one had good quality (Vinokur et al., 1990), and one had satisfactory quality (Khan, Amatya, Pallant, & Rajapaksa, 2012) (table 4).

Table 4. Methodological quality of cohort follow-up studies included in the systematic review.

New Castle Ottawa Scale		Points	Cohort follow-up			
			Khan F.	Hodgson N.	Levy E.	Vinokur A.
Representativeness of the exposed cohort	Truly representative of the average/ somewhat representative of the average	1		1		1
	Selection from specific groups of users/ No description of the derivation of the cohort	0	0		0	
* Selection of the non-exposed cohort						
Ascertainment of exposure	Secure records/Structured interview	1	1	1	1	1
	Written self-report/No description	0				
Demonstration that outcome of interest was not present at start of study		Yes: 1		1	1	1
		No: 0	0			
* Comparability of cohorts based on the design or analysis						
Assessment of outcome	Independent blind assessment/ record linkage	1		1	1	1
	Self-report/No description	0	0			
Was follow-up long enough for outcomes to occur?		Yes: 1	1 (Mean: 2 years)	1 (4 years)	1 (5 years)	
		No: 0				(10 months average)
Adequacy of follow up of cohorts	Complete follow up - all subjects accounted for/ Subjects lost to follow up unlikely to introduce bias - small number lost -	1	1	1	1	
	Low follow-up rate < 20%/ No statement	0				0
		Total	3	6	5	4

* Exclusive aspects of cohort studies (comparison from the exposition/non-exposition), that cannot be applied to cohort follow-up studies.

Instruments used for the evaluation of functional capacity

To determine functional capacity, the studies used instruments such as the physical function and physical role of the SF 36 scale (Hodgson & Given, 2004), the Functional Independence Measure (FIM) (Khan, Amatya, Pallant, & Rajapaksa, 2012; Khan, Amatya, Pallant, Rajapaksa, et al., 2012), the upper limb disability questionnaire (ULDQ) (Levy et al., 2012), two used the functional questionnaire suggested by Wingate L (Cinar et al., 2008; Oliveira et al., 2009; Wingate, 1985), the functional component of the EORTC QLQ-C30 (Eyigor et al., 2010; Ligibel et al., 2016), the disabilities of the arm, shoulder and hand (DASH) questionnaire (Lindquist et al., 2015), and the questions on 10 activities suggested by Rosow and Bresslad (Vinokur et al., 1990). Given the fact that the majority of the scales generated a quantitative result, most of the studies were guided by statistically significant changes in the mean/median of the score

of the instrument, and only one study established an increase of 10 to determine recovery (Hodgson & Given, 2004).

Factors related with the recovery of functional capacity

In population with breast cancer at different stages

Khan F's study identified a positive relation between receiving chemotherapy and recovery of FC ($p=0.02$) in breast cancer survivors who had known limitations, including mobility at the time of discharge from the hospital (Khan, Amatya, Pallant, & Rajapaksa, 2012); while Eyigor S found a positive relation with the intervention through Pilates exercises with an hour per day, three times per week, during eight weeks, gradually increasing the intensity each week (measured by the difference between the median of the scores pre and post-intervention through the functional component of the EORTC QLQ-C30: pre

77.07±14.96, post 83.26±14.70, $p=0.003$, and the functional component of the EORTC QLQ-C30 BR23: pre 77.81±16.62, post 84.39±10.47, $p=0.003$) (Eyigor et al., 2010).

In this population, Khan F also identified an inverse (negative) relationship between FC recovery and with upper limb weakness ($p=0.04$) (Khan, Amatya, Pallant, & Rajapaksa, 2012).

In incident breast cancer

Regarding the two studies that included women with newly diagnosed breast cancer, Levy E found a negative relation with surgery in the dominant side ($p<0.05$) and a BMI ≥ 25 ($p<0.05$) increase the difficulties informed for lifting and elevation activities (Levy et al., 2012). In a one-year follow-up to women with breast cancer, meanwhile Vinokur A found that the symptoms that limit the activity are significantly lower in older patients who undergo a less extensive surgery compared to younger women, but is considerably higher in patients with major surgeries ($p<0.05$) (Vinokur et al., 1990).

In a patient with lymphedema secondary to breast cancer

The Lindquist H study, which included patients with lymphedema secondary to breast or gynecological cancer, reported that a factor that was positively related to the recovery of FC, was the performance of exercises on the ground compared to exercises in water in (DASH score pre 24 RIC: 6-23, post 15 RIC: 6-23) (Lindquist et al., 2015).

In postsurgical management of breast cancer

Regarding the four studies that included a population with breast cancer, after surgery; Hodgson N found a positive relationship with the psychological wellbeing (OR: 1.8, $p=0.02$, CI 95%: 1.09-3.2) (Hodgson & Given, 2004). For his part Cinar N identified that early rehabilitation from the first day after the surgery in patients subjected to modified radical mastectomy, with 15 sessions of an individual rehabilitation programme, followed by a physical activity programme at home (with statistically significant differences compared with the control group that only received instructions on exercises to do at home after removing the drainage, $p<0.05$ (Cinar et al., 2008), was also related to improvements in FC. Finally, according to the findings of Wingate L, the physiotherapeutic treatment for 30 minutes per day, two times per week

during hospitalization (approximately 10 days), doing assisted active exercises for the shoulder, resisted active exercises, proprioceptive neuromuscular facilitation, functional activities and indication of exercises at home during eight weeks; after three months there were statistically significant improvements in the development of activities like close a back fastening brassiere ($p<0.025$), zip up a dress with a back fastening zipper ($p<0.025$), washing the upper part of the back at the scapula level on the side opposite the surgery ($p<0.05$), and making a double bed ($p<0.025$) (Wingate, 1985).

Hodgson N also identified inverse relation (negative) among FC recovery and variables like the presence of comorbidities (OR: 0.578, $p=0.03$, CI 95%: 0.347-0.961) and the severity of the symptoms in surgical management patients (OR: 0.575, $p=0.04$, CI 95%: 0.341-0.954) (Hodgson & Given, 2004).

Other variables were explored regarding their relation with FC recovery; nevertheless, the researchers did not find statistically significant results. These included: psychosocial wellbeing (OR: 1.7, $p=0.12$, CI 95%: 0.842-3.81), unsatisfied needs (OR: 0.723, $p=0.26$, CI 95%: 0.426-1.22) (Hodgson & Given, 2004), treatment through outpatient rehabilitation ($z=-0.39$, $p=0.70$) (Khan, Amatya, Pallant, Rajapaksa, et al., 2012), aerobic exercise based at home during 16 weeks (with a 4.79 point variation in the functional component score of the EORTC QLQ-C30 vs. 0.93 in the control group, $p=0.23$) (Ligibel et al., 2016), and doing shoulder exercises during radiotherapy ($p=0.43$) (Oliveira et al., 2009).

Discussion

This review found that many of the papers located by means of the search strategy were centred in exploring the factors that relate to the deterioration of FC (Braithwaite et al., 2010; Hoffner et al., 2017; Markes et al., 2007; Sánchez, 2013). Many of the studies used the term FC when referring to aspects like quality of life, physical activity, aerobic capacity, and not the degree of independence and autonomy for the development of ADL and IADL, which were the objective of this research.

The studies selected for having the desired outcome had differences in regard to the used instruments; some were specific for the assessment of FC, such as the FIM scale, which through two dimensions, 13 motor items, and five cognitive items, evaluates aspects like personal care, bladder and bowel control, transferences, locomotion, communication, and outer

world awareness (Rozo & Juliao, 2013). The DASH questionnaire was also included, which has 30 questions; five pure deterioration elements, 19 activity limitation elements, and three participation restriction elements, also has items that jointly measure activity limitation and participation restriction (Hervás et al., 2006; Yhang et al., 2015). Additionally, in some studies the evaluation of functional capacity was performed using subscales within instruments to assess quality of life, such as the SF36 (physical function, physical role, emotional role, social function, mental health, general health, body pain, and vitality) (Bohannon & DePasquale, 2010, p. 36; Vilagut et al., 2005) and QLQ-C30 (physical functioning, day-to-day activities, emotional functioning, cognitive functioning, and social functioning) (Waldmann et al., 2007) in some studies. This variability in the measurements supports what was described in the Third International FC evaluation Research Conference held in the Netherlands, whose report was published in March 2018, in which it was concluded that until then, there was no consensus regarding the best assessment tool to evaluate ADL (James et al., 2016). In most studies, the cut-off points to determine recovery are not described, and many of them use statistically significant changes without reporting the parameters to identify clinically significant findings.

Currently there are recommendations to use the appropriate instruments, depending on the outcome of interest, which is why tools such as DASH have been widely accepted in the assessment of FC in women with breast cancer, since it has been shown to have good psychometric properties for Limb assessment (Bot et al., 2004; García González et al., 2017; Germann et al., 1999; Hervás et al., 2006), one of the most affected areas in relation to the collateral effects that interventions such as breast surgery and radiotherapy can produce (Yhang et al., 2015). Furthermore, this tool is theoretically related to the CIF, since it contains; 5 elements of pure deterioration, 19 elements of limitation in activity and 3 elements of restriction in participation, in addition to including items that jointly measure limitation in activity and restriction in participation in areas such as work (Yhang et al., 2015). When evaluating functional capacity, these instruments should be preferred over those that have been developed for other purposes, such as the assessment of quality of life in general.

Seven out of the eleven studies were experimental, and four of them had good methodological quality. Of this group, the study by Khan F and the study by Ligibel JA, did not find a statistically significant change in

FC after treatment treatment with outpatient rehabilitation (Khan, Amatya, Pallant, Rajapaksa, et al., 2012) and aerobic exercise based at home (Ligibel et al., 2016); but previous studies did identify changes after the intervention based on rehabilitation at home related to a decrease in fatigue and cardiopulmonary capacity improvement (Yuen & Sword, 2007). It is important to understand that the differences occur mainly due to the variety in the strategies, follow-up processes, and studied outcomes (Chung et al., 2013).

The clinical trials carried out by Cinar N, which includes early rehabilitation from the first postoperative day (Cinar et al., 2008), Eyigor S that involved pilates exercises (Eyigor et al., 2010), Lindquist H in a population with lymphedema after mastectomy (Lindquist et al., 2015), and Wingate L who applied as treatment a combination of exercises in hospitalization and others at home, reported that these strategies were related to the recovery of functional capacity in women with breast cancer, which supports what was presented by other authors who point out that involving exercise in rehabilitation processes of this population is beneficial (Volaklis et al., 2013; Yuen & Sword, 2007), especially in the function of the shoulder, if you work through structured exercise plans (McNeely et al., 2010). Exercise has been described as having multiple benefits at cardiovascular, metabolic and bone health in general population (Colado et al., 2020; Gómez-Álvarez et al., 2019) and in women with breast cancer (Kirkham et al., 2016; Volaklis et al., 2013) and that even the type of exercise that is performed determines the degree of recovery, finding better results with resistance exercise compared to aerobic exercise (Yuen & Sword, 2007), among other reasons because it has been found to help regain muscle strength and reduce fatigue symptoms related to treatments, which in turn helps improve the ability to carry out activities of daily living (Volaklis et al., 2013).

Hodgson N's study found a relationship between psychological well-being and recovery of FC (Hodgson & Given, 2004). Previous reports have described the fact that the emotions, beliefs, ideas, and thoughts of the individuals may affect their conduct, and specifically, they may determine continuity of treatments and perseverance when attending the sessions in rehabilitation processes (Martínez-Basurto et al., 2014).

Moreover, a inverse relation between FC and the clinical aspects such as the severity of the symptoms, the presence of comorbidities (Hodgson & Given, 2004), and the presence of upper limb weakness (Khan, Amatya, Pallant, & Rajapaksa, 2012) were identified, which were negatively related to the recovery of FC, these are important aspects to keep in

mind, particularly during the initial assessment. Some authors have reported that failure to identify pain and the underestimation of its severity might lead to inadequate treatments (Reis et al., 2018).

The incorporation of aspects that improve FC and the limitation, mitigation and management of those that are negatively related to recovery, should be aspects to be taken into account in the population with breast cancer, given this generates a direct positive impact on the Dominance of physical functioning and indirectly through a positive effect on emotional functioning and social interaction (Garabeli Cavalli Kluthcovsky et al., 2012; Hamood et al., 2018).

The studies reported limitations like small sized samples (Khan, Amatya, Pallant, Rajapaksa, et al., 2012; Ligibel et al., 2016), non-probabilistic or non-randomized sampling (Hodgson & Given, 2004; Wingate, 1985), the existence of a high baseline functional state, which makes it difficult to find differences during follow-up (Ligibel et al., 2016), and very short follow-up periods (Oliveira et al., 2009). Regarding the clinical trial developed by Eyigor S, a high number of withdrawals in the control group, and a lack of double-blinding were reported as limitations (Eyigor et al., 2010).

It is important to highlight that the importance of FC assessment does not reside on it determining if people are capable of carrying out ADLs or not, but on the fact that this is one of the most important components in quality of life constructs (Calvo-Rodríguez et al., 2018); For physical rehabilitation services (those that mainly focus on this component), it is important to have a guiding element, not only to identify those aspects that require further intervention, but also a follow-up tool to identify the progress after various interventions.

Limitations

The present review was based on the findings of 5 databases, in addition 32 systematic reviews related to recovery in breast cancer were explored (without obtaining additional articles to those obtained in the direct search); However, it was limited to databases that publish in the English, Portuguese and Spanish languages. Additionally, it was not possible to locate the full version of one of the articles that, due to the title and the abstract, indicated that they met the selection criteria (Roche et al., 1997).

Conclusions

In this research, factors related positively or negatively with FC recovery were identified: psychological factors (psychological wellbeing), factors related to rehabilitation strategies (comprehensive physiotherapy intervention, Pilates, exercises on the ground), clinical aspects (severity of the symptoms, presence of comorbidities, pain, weakness, numbness), and others related to the treatments (receiving chemotherapy, rehabilitation start time, at home therapy). Nevertheless, some results emerge from bad methodological quality studies, according to the assessment carried out in this review, and as such, they should be revised carefully. It was also found that there is no standard when evaluating FC in women with breast cancer. It is necessary to increase quality research on the factors that benefit FC recovery in women with breast cancer, using standardized instruments that allow for comparability among groups, so that the results obtained might be taken into account in the rehabilitation processes when establishing treatment plans.

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