

Kinesiotherapy decreases upper limb pain in females submitted to mastectomy or quadrantectomy*

A cinesioterapia reduz a dor no membro superior de mulheres submetidas à mastectomia ou quadrantectomia

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SUMMARY

BACKGROUND AND OBJECTIVES: Physical therapy is a major rehabilitation tool after breast cancer surgery. This study aimed at comparing movement amplitude (MA), pain intensity in upper limb ipsilateral to surgery (UL) and at characterizing pain before, during and after a kinesiotherapy program, in addition to correlating such variables.

METHOD: Participated in this study 39 females submitted to breast cancer surgery. Physical therapy program has involved UL stretching, free-active and free-assisted exercises. MA was evaluated by goniometry; pain intensity was evaluated by visual analog scale (VAS) and characterized by McGill pain questionnaire in the beginning, after 10 and after 20 kinesiotherapy sessions. McGill has supplied the score of number of words chosen (NWC), of pain ranking index (PRI) and of its categories. Wilcoxon Signed Rank Test and Spearman correlation test were used, considering $p < 0.05$.

RESULTS: There has been pain intensity decrease when comparing the 1st to the 10th session ($p = 0.033$). There has been significant MA improvement and significant decrease of total PRI and NWC when the beginning was compared to the 10th session and to the 20th session. All PRI categories have significantly decreased after 10th and 20th sessions, except for the affective. No correlation was found among MA, VAS, MWC and PEI.

CONCLUSION: Kinesiotherapy has improved MA and has decreased UL pain, especially in the beginning of the intervention, showing the importance of an early physical therapy approach.

Keywords: Breast cancer, Mastectomy, Pain, Pain measurement, Physical therapy.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A fisioterapia é uma importante ferramenta na reabilitação após a cirurgia para tratamento do câncer de mama. Os objetivos do estudo foram comparar a amplitude de movimento (ADM), a intensidade de dor no membro superior (MS) homolateral à cirurgia e caracterizá-la antes, durante e após programa de cinesioterapia, além de correlacionar estas variáveis.

MÉTODO: Foram incluídas 39 mulheres submetidas ao tratamento cirúrgico do câncer de mama. O programa de fisioterapia envolveu alongamento, exercícios ativos e ativos-assistidos de MS. A ADM foi avaliada pela goniometria, a intensidade de dor pela escala analógica visual (EAV) e caracterizada pelo questionário de dor de McGill no início, após 10 e após 20 sessões de cinesioterapia. Do McGill, foi obtido o escore do número de palavras escolhidas (NWC), do índice de avaliação da dor (PRI) e de suas categorias. Utilizou-se o Wilcoxon

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Signed Rank Test e correlação de Spearman, considerando $p < 0,05$.

RESULTADOS: Verificou-se redução da intensidade de dor quando comparada a 1ª com a 10ª sessão ($p = 0,033$). Observou-se aumento significativo da ADM e diminuição significativa do PRI total e NWC quando comparado o início com a 10ª sessão e início e 20ª sessão. Todas as categorias do PRI diminuíram significativamente após a 10ª e s 20ª sessão, exceto a afetiva. Não foi encontrada correlação entre ADM, EAV, NWC e PRI.

CONCLUSÃO: A cinesioterapia melhorou a ADM e reduziu a dor no MS, especialmente no início da intervenção, evidenciando a importância da abordagem inicial da fisioterapia.

Descritores: Dor, Fisioterapia, Mastectomia, Medição da dor, Neoplasias da mama.

INTRODUCTION

Breast cancer (BC) is the most prevalent malignancy among females, being in Brazil the major cause of death due to malignancies among females. Every year, approximately 20% of new cancer cases among females are breast cancer, and 52,680 new cases of the disease are expected for 2012¹.

In spite of the evolution in diagnosis and management, and of the possibility of using the sentinel lymph node technique, radical or conservative surgical procedures still prevail^{3,4}. Surgical treatment goes from lumpectomy to mastectomy associated or not to the resection of axillary lymph nodes. Axillary lymph node dissection (AL) is mostly used to stage the disease, to orient the choice of adjuvant therapy and the prognosis. Additionally, it may be used as adjuvant and/or neoadjuvant to chemotherapy (CT), radiation therapy (RT) and hormone therapy.

Very often, surgical BC treatment may bring complications, such as local infections, skin necrosis, scar retraction, respiratory dysfunctions, lymphedema, functional changes, nervous injuries, sensitivity disorders, changes in movement amplitude (MA) of the shoulder, and pain²⁻⁶. It is believed that AL is one of the major justifications for postoperative complications and morbidity, exactly due to lymph nodes resection, location and extension of the surgical treatment.

Post-mastectomy painful syndrome is defined by the International Association for the Study of Pain (IASP) as chronic pain starting after mastectomy or quadrantectomy, located in the anterior chest, axilla and/or upper third of the arm, and which persists for more than three months after surgery³. Fear of moving the limb and postoperative inactivity lead to gradual impairment

of muscle strength and flexibility, and MA worsening, predisposing to pain²⁻⁴. Pain deserves attention for being directly related to physical and emotional wellbeing, to performance and achievement of daily life activities (DLA), as well as to quality of life (QL)⁵⁻¹². In this sense, kinesiotherapy after surgical procedures is critical to prevent and manage pain^{10,11,13,14}.

Early kinesiotherapy with stretching, active-free and active-assisted exercises for the upper limb (UL), helps preventing and managing pain symptoms, being indispensable tool to reestablish physical function and labor, social and functional reinsertion of these females^{10,11}.

Given that functional impairment and pain complaints are common symptoms of BC postoperative period, and that kinesiotherapy plays an important role in rehabilitation, this study aimed at comparing pain intensity in the UL ipsilateral to surgery and at characterizing pain before, during and after a kinesiotherapy program.

METHOD

This was an analytical, descriptive and longitudinal case study carried out at OncoHematos Physical Therapy Sector from the Fundação de Beneficência Hospital de Cirurgia, city of Aracaju, SE, from May to October 2011. All participants have signed the Free and Informed Consent Term (FICT), according to Resolution 196/96 of the National Council of Health.

Participated in the study females submitted to surgical BC treatment and with pain in the UL ipsilateral to the surgery. UL pain was considered any pain complaint in anterolateral inner arm, which could or not extend to lateral chest wall and/or shoulder. Exclusion criteria were UL pain before surgery, upper limbs (UULL) rheumatologic and/or orthopedic problems, especially in UL ipsilateral to surgery, lymphedema with perimeter of 4 cm, clinical diagnosis of metastasis, those who underwent previous physical therapy treatment, in simultaneous use of analgesics or anti-inflammatory drugs and with visual or cognitive deficits which could impair the understanding of the tools of this research.

All patients referred to physical therapy were evaluated and data were recorded in evaluation cards with socio-demographic and clinical-surgical data, such as type of surgery, side, number of dissected and involved lymph nodes, surgery duration, chemotherapy and radiation therapy. Goniometry was performed at physical evaluation to check shoulder joint MA, including flexion/extension, abduction/adduction and internal and external rotation movements. A goniometer was used (plastic tool made up of a complete circle graduated from zero to

360° with two articulated arms, from the CARCI® brand) and values were recorded in degrees. During evaluation patients would remain with the region to be evaluated naked, would perform active-free shoulder movements with duly aligned posture. At initial evaluation, MA was collected from UULL, but in other moments only the UL ipsilateral to surgery was considered. Each joint measurement was repeated three times and mean of these measurements was adopted as final value.

Pain intensity in the UL ipsilateral to surgery was evaluated by the visual analog scale (VAS) and pain was characterized by McGill pain questionnaire before kinesiotherapy, and after the 10th and the 20th session.

VAS is a one-dimension pain measurement tool, consisting of a 10 cm long horizontal line which has at one edge the classification “no pain” and at the other the classification “worst imaginable pain”. Patients were asked to put a trace perpendicular to the line at the point representing their pain intensity. After this the line was measured with a ruler, in cm, from the beginning of the line, corresponding to zero, to the marked point, thus obtaining a numerical value representative of pain intensity.

McGill pain questionnaire, in its Brazilian version (Br-MPQ) was used to measure multidimensional aspects of pain. Br-MPQ has 68 words describing different qualities of the painful experience, and which are chosen by patients to characterize pain. Word descriptors are divided in four categories: sensory, affective, evaluative and mixed. Each category is divided in 20 subcategories with two to six word descriptors each. Patients were asked to choose none or just one word from each subcategory which would be closest to perceived pain.

As from Br-MPQ questionnaire, two scores measures were obtained: number of words chosen (NWC) and pain ranking index (PRI). NWC corresponds to the number of word descriptors chosen, which may be no more than 20 because patients could only choose one word descriptor per subcategory. PRI corresponds to the sum of values attributed to each word chosen from the questionnaire, being maximum possible value = 68.

Additionally, PRI may have a total score for each of the four categories: sensory, affective, evaluative and mixed. For both PRI and NWC the higher the score the more severe the pain.

All participants were submitted to 20 physical therapy sessions, three times a week, in individual sessions lasting in average 60 minutes. Kinesiotherapy protocol for UULL involved cervical stretching and active-free shoulder flexion, extension, abduction, adduction, internal rotation and external rotation movements, isolated or in combination. Exercises were progressively applied

according to each patient’s evolution^{12,13}. Kinesiotherapy and application of questionnaires were conducted by two duly trained researchers.

Data were analyzed by the BioEstat 5.0 program and described as central trend (mean), dispersion (standard deviation), frequency and percentage. When data distribution was not normal, Wilcoxon Signed Rank Test was used to compare pain intensity by VAS and Br-MPQ questionnaire scores before, and after the 10th and the 20th physical therapy session. Spearman correlation test was used to correlate among variables. Significance level was $p \leq 0.05$ for all analyses.

This study was approved by the Ethics and Research Committee, Federal University of Sergipe (UFS) under CAAE 0077.0107-00-10/2010.

RESULTS

Forty females were selected and one was excluded for not having pain before treatment. For the 39 included females mean age was 50.6 ± 10.8 years and body mass index (BMI) was 25.5 ± 11.6 kg/m². Most were married (53.8%), were housewives or had other autonomous activities in the same ratio (35.8%). As to associate diseases, 40% of females had diabetes mellitus and 10% hypertension. No patient was under analgesic or anti-inflammatory drugs simultaneously to physical therapy. Most frequent surgery was radical mastectomy (87.1%) at the left side (61.5%) with mean lymph node resection of 17.3 ± 6.2 , with mean of 1.8 ± 3.3 involved lymph nodes. Most females were submitted to adjuvant CT, 38.4% were submitted to adjuvant RT and 56.4% did not receive RT. Most females (61.5%) were referred to physical therapy in up to six months after surgery (Table 1). Pain intensity by VAS has significantly decreased from 3.8 ± 1.7 to 3.0 ± 1.9 when first session was compared to 20th session ($p = 0.03$). Along treatment there has been no significant decrease when beginning of treatment was compared to the 20th session ($p = 0.09$) as well as when 10th session was compared to 20th session ($p = 0.79$). After the 10th session, two females reported no UL pain (VAS = 0) and after the 20th session five females also had no pain. There has been significant Br-MPQ questionnaire PRI and NWC scores decrease when first session was compared to the 10th session ($p = 0.0021$ and $p = 0.0159$) and when first and 20th session were compared ($p = 0.0001$ and $p = 0.0003$); however, there has been no significant difference when 10th and 20th sessions scores were compared (Table 2).

There has been significant pain scores decrease in all PRI categories in the first and the 10th session (Table 3).

When first session was compared to 20th session, only the affective category has not shown statistical difference, and when 10th session was compared to 20th session, no score had significant difference.

MA has significantly improved for all evaluated movements. Although there has been MA improvement in all

evaluated moments, there has only been significant difference when initial moment was compared to 10th and the 20th session (table 4).

There has been no correlation between MA and pain intensity in all evaluated moments (Table 5). There has also been no correlation of PRI and NWC, and MA.

Table 1 – General and treatment aspects (n = 39) .

	n (%)
Types of surgery	
Radical mastectomy	34 (87.1)
Quadrantectomy	5 (12.9)
Surgery side	
Right	15 (38.5)
Left	24 (61.5)
Chemotherapy	
No	10 (25.5)
Neoadjuvant	8 (20.5)
Adjuvant	21 (54.5)
Radiation therapy	
No	22 (56.4)
Neoadjuvant	2 (5.1)
Adjuvant	15 (38.4)
Time between surgery and physical therapy	
Before 6 months	24 (61.5)
After 6 months	15 (38.5)
Number of resected lymph nodes*	17.35 ± 6.26
Number of involved lymph nodes*	1.85 ± 3.32

* Values in mean ± standard-deviation.

Table 2 – Comparison of pain intensity in upper limb ipsilateral to surgery and of Br-MPQ scores in the beginning, after 10th and 20th kinesiotherapy sessions (n = 39).

	Beginning 1 st Session	After 10 th Session	After 20 th Session	p1	p2	p3
VAS	3.8 ± 1.7	3.0 ± 1.9	3.1 ± 2.1	0.033*	0.095	0.795
Total PRI	25.1 ± 11.3	19.3 ± 11.2	17.6 ± 11.0	0.0021*	0.0001*	0.1217
NWC	12.7 ± 4.4	10.2 ± 4.7	9.6 ± 5.4	0.0159*	0.0003*	0.0346

VAS = visual analog scale; NWC = number of words chosen; PRI = Pain Ranking Index.

Values in mean ± standard deviation; * Wilcoxon Signed Rank Test. p < 0.05;

p1: 1st versus 10th session; p2: 1st versus 20th session; p3: 10th versus 20th session.

Table 3 – Scores of pain evaluation index categories in the beginning after 10th and after 20th session (n = 39).

Categories	Beginning 1 st Session	After 10 th Session	After 20 th Session	p1	p2	p3
Sensory	15.1 ± 16.2	11.8 ± 6.3	10.8 ± 6.3	0.0126*	0.0002*	0.2556
Affetive	5.2 ± 4.0	3.9 ± 4.2	3.6 ± 3.0	0.0185*	0.1790	0.9914
Evaluative	1.9 ± 1.3	1.4 ± 1.1	1.5 ± 1.3	0.0507*	0.0476*	0.8339
Mixed	3.1 ± 2.9	2.3 ± 2.5	2.0 ± 2.3	0.0495*	0.0032*	0.1701

Values in mean ± standard deviation; * Wilcoxon Signed Rank Test. p < 0.05; p1: 1st versus 10th session; p2: 1st versus 20th session; p3: 10th versus 20th session.

Table 4 – Comparison of movement amplitude of limb ipsilateral to surgery in the beginning, after 10th and after 20th kinesiotherapy session (n = 39).

Movement Amplitude	Beginning 1 st Session	After 10 th Session	After 20 th Session	p1	p2	p3
Flexion	113.8 ± 30.7	143.0 ± 22.5	148.7 ± 22.7	0.0001*	0.0002*	0.1470
Extension	45.8 ± 10.1	53.0 ± 10.8	41.7 ± 25.0	0.0043*	0.0088*	0.2949
Abduction	113.3 ± 28.8	139.7 ± 20.9	144.2 ± 25.5	0.0001*	0.0021*	0.4022
Adduction	26.3 ± 15.5	33.7 ± 16.2	41.7 ± 25.0	0.0007*	0.0001*	0.4071
External rotation	71.4 ± 18.3	79.2 ± 15.5	80.3 ± 11.4	0.0104*	0.0351*	0.9612
Internal rotation	71.5 ± 17.2	73.5 ± 16.3	61.1 ± 19.8	0.0001*	0.0002*	0.3016

Values in mean ± standard deviation; * Wilcoxon Signed Rank Test. p < 0.05; p1: 1st versus 10th session; p2: 1st versus 20th session; p3: 10th versus 20th session.

Table 5 – Correlation between flexion, abduction and external rotation movement amplitude of the limb ipsilateral to surgery and pain intensity in the beginning, after 10th and after 20th kinesiotherapy sessions (n = 39).

Movement Amplitude	Visual Analog Scale					
	Beginning 1 st Session	p value	After 10 th Session	P value	After 20 th Session	p value
Flexion	r = -0.0298	0.8570	r = 0.2408	0.1396	r = 0.2451	0.1326
Extension	r = -0.2637	0.7934	r = 0.0589	0.7217	r = 0.1509	0.3590
Abduction	r = -0.2710	0.8699	r = 0.1381	0.4017	r = 0.2280	0.1626
Adduction	r = 0.5210	0.0675	r = 0.4580	0.1082	r = 0.6996	0.5217
Internal rotation	r = 0.2671	0.1001	r = 0.1621	0.3241	r = 0.2672	0.1021
External rotation	r = 0.3868	0.1180	r = 0.5131	0.1034	r = 0.6324	0.2534

r = Pearson's correlation. p < 0.05.

DISCUSSION

BC diagnosis and management bring physical-functional, psychological and social repercussions^{2-7,12}. Pain is a common complaint during treatment and negatively impacts daily life and QL^{2,3,5-8,12}. In this context, physical therapy participates in post-surgical complications prevention and in early rehabilitation for daily life activities^{7-11,13}.

In our study, radical mastectomy was predominant and it is believed that the larger the extension of AL-related surgery, the higher the possibility of complications^{2,5,6}. In this sense, the literature⁹⁻¹³ is clear about the importance of kinesiotherapy to control pain after BC surgical treatment, and the earlier it is applied, the lower the possibility of MA restrictions, there are less pain complaints and higher functionality^{10,12}.

There has been significant pain decrease by VAS after the 10th session; however values were maintained when pain was evaluated after the 20th session. Approximately five females reported no pain (VAS = 0) after 20 kinesiotherapy sessions. Although a significant VAS decrease was observed in the beginning of the treatment, mean values were considered mild to moderate pain. Clinically this difference may not represent a considerable change in pain, since VAS values were low.

A different study also using VAS in BC postoperative period has stressed that most females had moderate pain, considered between 3 and 7³. Even considered mild, pain should be valued in clinical practice, because it is a limiting factor for daily lives of these females and negatively impacts home services, labor activities, dressing and hygiene activities and personal relations. When pain intensity and feature decrease, females feel freer to perform their physical and social activities. The fact that mean VAS was considered mild to moderate pain may be also attributed to emotional and individual pain handling factors because these are females being treated against cancer. So, arm pain may be less valued than cancer, representing the coping and resilience capacity of these females.

It is believed that females adhere more to exercises in the beginning of the treatment because this is the moment when they are positively influenced by factors, such as perception of physical therapy benefits¹⁵. One may also say that when they experience improvement in the beginning of the treatment they feel freer and more able to perform other activities which require UL effort and this may have contributed to maintain pain intensity, although decreased. Another explanation would be that UL pain after BC surgery may be related to intercostal

nerve injury and this injury may determine change in sensitivity of arm and chest wall, justifying the constant presence of pain.

IASP considers as post-mastectomy painful syndrome a period of at least 3 postoperative months, but the literature is not precise in defining chronic pain after BC surgical treatment because it depends on evaluated criteria and used adjuvant therapies³. Since more than half of our sample was referred to physical therapy in up to six postoperative months, one may clinically consider that most of them had no permanent chronic pain.

This may also influence results because some patients started physical therapy approximately six months after surgery and they could have chronic and residual pain. Since this study aimed at comparing pain before and after physical therapy, regardless of time after surgery, such inferences are not allowed by the design of the study and the analysis used.

As to Bar-MPQ scores, there has been significant decrease along evaluated moments, especially after 10 physical therapy sessions. After physical therapy, fewer words were used to describe and characterize pain because it had decreased. This reinforces the hypothesis that early treatment is critical for the good evolution of pain symptoms.

It has also been observed that categories most reported by females to characterize pain were sensory and affective. Sensory category, made up of 10 subcategories refers to mechanical, thermal, vividness and spatial properties of pain¹⁴. It is important to mention that sensory pain features are major criteria to describe presence of neuropathic pain, which is common after nervous injury, such as intercostal nerve injury.

The affective category is made up of five subcategories describing pain affective dimension such as stress, fear, tiredness and neurovegetative responses¹¹. However, the Br-MPQ questionnaire has a disproportional distribution of word descriptors by category since from 68 word descriptors, 34 (50%) refer to sensory aspects of pain¹⁴. This has been the reason for questionings among authors because it is believed that the person evaluated is induced to choose more sensory word descriptors, as observed in our study.

In our study, kinesiotherapy was important to increase MA and to decrease pain in the beginning of the treatment and to keep it controlled along time. But when pain evaluation and MA variables were correlated, there has been no significant correlation in all evaluation moments, maybe due to the small sample size, to low pain

intensity and to minor differences in its values along evaluations. No similar studies were found in the Brazilian literature, which limits possible inferences.

In spite of the small number of participants, it was possible to observe that physical therapy participates in UL pain decrease and in MA improvement.

In the clinical practice of many professionals working in private clinics and with health insurance, these results may reinforce the need for mastectomized females to attend at least 10 physical therapy sessions, which seems to be enough to improve pain and MA, but whenever possible, a longer follow-up brings additional and permanent benefits. Further studies with designs including a control group and large sample size may contribute to improve assistance to these patients and to professionals involved with rehabilitation.

CONCLUSION

Kinesiotherapy has significantly improved upper limb movement amplitude and has significantly decreased pain in the UL ipsilateral to BC surgery along treatment, especially in the beginning of the intervention.

ACKNOWLEDGMENTS

To patients participating in this study and the the Special Program of Scientific Initiation Inclusion – PIIC / POSGRAP/PROEST/UFS.

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Submitted in April 04, 2012.

Accepted for publication in July 31, 2012.

Conflict of interests: None – Sponsorship: Special Program of Scientific Initiation Inclusion (PIIC, POSGRAP/PROEST/UFS).