v. 2, n. 27, 2022

International Journal of Health Science

CORRELATION BETWEEN AXILLARY LYMPHADENECTOMY AND RANGE OF MOTION IN PATIENTS WHO UNDERWENT SURGICAL TREATMENT FOR BREAST CANCER

Maria Joanna Siqueira Freire
https://orcid.org/0000-0003-1501-8599

Jarbas Maciel de Oliveira
https://orcid.org/0000-0002-9123-5862

João Luiz Quirino da Silva Filho
https://orcid.org/0000-0002-4992-6168

Abstract: Introduction: Breast cancer represents one of the leading causes of death in the world. In Brazil, it is the second most common cancer among women. More than 66,000 cases are expected this year. Surgical treatment is the most prevalent, consisting of total or partial removal of the tumor. In this context, several complications may arise in the shoulder ipsilateral to the surgery, such as: reduced range of motion, lymphedema, seroma and others. **Objective:** To evaluate the repercussions of axillary lymphadenectomy for the treatment of breast cancer on the range of motion of the shoulder ipsilateral to surgery. **Methodology:** A cross-sectional, descriptive, quantitative study was carried out with women treated in the mastology sectors of UPAE-Arcoverde and Hospital Memorial Arcoverde. To carry out this study, the sociodemographic and clinical characteristics of the patients were collected. Assessments of lymphedema and range of motion were obtained through physical examination. **Results:** Participated in the study 11 women with a mean age of 54,2 (±9,37) years old. Among the surgical techniques used, radical mastectomy prevailed. (72,7%), followed by serectomia (27,3%). He was observed Association statistically significant in between lymphadenectomy and reduction of ADM in bending movements (p= 0,012) and abduction (p= 0,003).In the perimetry of the arm and forearm, there was no relationship between lymphadenectomy and the development of lymphedema. **Conclusion:** Regardless of the surgical modality performed, when associated with axillary lymphadenectomy, reductions in the range of motion for flexion and abduction of the shoulder ipsilateral to the surgery occur, even if lymphedema has not developed.

Keywords: Breast cancer, Mastectomy, Range of joint motion, Lymphadenectomy. Lymphedema.

INTRODUCTION

Breast cancer is characterized as a chronic degenerative disease, caused by the disordered multiplication of neoplastic breast cells. In Brazil, disregarding non-melanoma skin tumors, it is the most common type among women. For the year 2021, the incidence was estimated at more than 66 thousand cases. It is usually rare before the age of 35, but above that age, its incidence shows a progressive increase, especially after the age of 50 (LOPES et al., 2009; AZEVEDO et al., 2019; INCA, 2020).

In addition to age, other risk factors are: mutations in the BRCA1 and BRCA2 genes, reproductive characteristics (early menarche and/or late menopause), first pregnancy after age 30 and nulliparity; family and personal history that includes first-degree relatives with breast cancer under age 50, bilateral or ovarian cancer at any age, male breast cancer, breast cancer, or previous benign breast disease; lifestyle habits such as obesity, regular alcohol intake and smoking; and environmental influences, the main one being previous exposure to ionizing rays (BATISTON et al., 2011; SILVA; RIUL, 2012).

The diagnosis and prognosis, sometimes associated with the removal of the breast, represents a profound impact for women, bringing strong repercussions at a psychological and social level, affecting the perception of sexuality and their own body image, in a context where the breast is seen as a symbol of femininity. This fact leads to a consequent reduction in the quality of life (RODRIGUES, 2015).

The choice of treatment requires an individual and careful assessment of each case, involving a multiple approach, which includes surgery, chemotherapy, radiotherapy and hormone therapy, leading to serious physical consequences. Surgical treatment is the most prevalent, being considered one

of the safest treatments, but this form of removal can promote several complications such as changes in the shoulder ipsilateral to surgery, reduction in range of motion (ADM), lymphedema, seroma, pain, among others (LOPES, et al., 2009; SOUZA; SOUZA, 2014).

The progressive increase in cases of malignant breast cancer in women and the inevitable disorders caused by the forms of treatment on their lives are a current reality. In view of this, the objective of this article was to evaluate the repercussions of axillary lymphadenectomy for the treatment of breast cancer on the range of motion of the shoulder ipsilateral to the surgery.

MATERIALS AND METHODS

This is a cross-sectional, descriptive, quantitative study carried out with women treated at the Oncology Center of the Memorial Arcoverde Hospital (Memorial-Onco) and at the Pernambuco Specialized Care Unit (UPAE Arcoverde). The study was submitted to the Ethics Committee for Research on Human Beings of the Faculdade de Integração do Sertão and was approved by CAAE: 95965318.0.0000.8267 under protocol number 3,016,964. The study was conducted with the express consent of the patients, obtained after reading and signing the Free and Informed Consent Form.

Women over 18 years of age who underwent surgical treatment for breast cancer (radial, modified mastectomy or segmental resection) were included in the study, as long as it was associated with axillary lymphadenectomy.

Patients who underwent bilateral surgical protocols, who had infection in the upper limb and/or in the surgical incision, those who were unable to answer the questions and patients who opposed the physical assessment were excluded from the study.

The sociodemographic and clinical characteristics addressed through the semi-structured questionnaire (LOPES et al., 2009), presented in the form of an evaluation form (APPENDIX A), were: age, education, profession, body mass index (), arterial hypertension (HAS), side of surgery/ limb with lymphedema, types of surgeries performed, radiotherapy, chemotherapy, physiotherapeutic treatments, surgery time, among others. They were obtained through analysis of medical records and, when necessary, through interviews to complement the information.

For the analysis of Flexion, extension, abduction, horizontal adduction, internal and external rotation of the shoulders were evaluated through goniometry using a universal goniometer (CARCI® – São Paulo, Brazil). The measurements were taken bilaterally according to the positions described by Marques (2003), observing compensatory postures.

Perimetry was performed bilaterally, with the patients in a seated position, using a single measuring tape, where three markings were made on the arm and forearm, in the supine position, with the limb supported and relaxed every five centimeters, above and below the cubital fold. Lymphedema was characterized when at least one of the measurements of the ipsilateral limb to the surgery was greater than 2 cm in relation to the contralateral limb (VALINOTE, et al., 2013).

To analyze the results, the test was initially applied *Kolmogorov-Smirnov-Z*, noting that the studied sample comes from a population with a non-normal distribution. Thus, we opted for the application of non-parametric statistics, having as descriptive measures the division into medians and amplitudes, together with the distribution of frequencies. Subsequently, the Mann-Whitney U Test was applied to analyze the variables of shoulder

range of motion and perimetry, considering significant differences with p<0,05. During the performance of all statistical calculations, SPSS version: 2.0 software was used.

RESULTS AND DISCUSSION

Eleven women participated in the study with a mean age of 54.2 (±9.37) years, ranging from 40 to 67 years. Regarding the sociodemographic and clinical characteristics observed, it was found that 7 (63.6%) patients had completed high school or higher education, 6 (54.5%) performed household chores after treatment, 6 (54.5%) %) were overweight or obese, 4 (36.4%) had arterial hypertension and only 2 (18.2%) had diabetes (Table 1).

Increasing age is one of the most relevant risk factors for the development of breast cancer, being more common in perimenopausal women and uncommon in younger women, aged 35 years or younger (BELEZA et al., 2016). In the present study, 10 (90.9%) patients were diagnosed with breast cancer at the age of 39 years and 1 (9.1%) at 29 years of age. These data corroborate the statistics on the disease, which report an initial diagnosis comprised in the approximate age group presented in this research (INCA, 2020).

At the time of collection, most patients, 6 (54.5%), were overweight or obese (IMC ≥ 25 Kg/m^2) (MINISTRY OF HEALTH, 2017). This factor becomes worrying, as a BMI equal to or above 25 kg/m2, in addition to being a risk factor for the development of breast cancer, can cause several disorders to women's health. Studies have shown that overweight and obesity are unfavorable prognostic factors in patients with breast cancer, influencing the onset of recurrence, reduced disease-free survival and reduced overall survival, increased cancer-specific mortality rate and overall mortality and the increased risk of contralateral cancer (JERÔNIMO, 2013; PAPA et al., 2013; BELEZA et al., 2016; YAZICI et al., 2015). Among the surgical techniques used in the treatment of breast cancer, radical mastectomy prevailed, having been performed in 8 (72.7%) patients, with the others undergoing segmental extirpation of the tumor. All procedures were associated with axillary lymphadenectomy, with 5 (45.5%) undergoing surgery on the right breast and 6 (54.5%) on the left breast.

As for the adjuvant treatment, 9 patients (81.8%) underwent chemotherapy, radiotherapy and hormone therapy associated, 1 (9.1%) underwent only chemotherapy and radiotherapy and 1 (9.1%) underwent only hormone therapy (Table 1).

The therapeutic protocol for breast cancer involves a multivariate approach that includes surgery, chemotherapy, radiotherapy, hormone therapy and targeted therapy. In most cases, two or more methods are associated. In this context, surgical procedures range from lumpectomy to radical mastectomy, with or without axillary lymphadenectomy. Although the surgical techniques have undergone great evolution, they continue to cause the emergence of different complications in the short or long term, such as: dehiscence and scar adhesions, restriction of ADM shoulder pain, reduced muscle strength, lymphedema, changes in local sensitivity, shoulder and/or arm pain and changes in body posture (ALBUQUERQUE et al., 2013; BARBOSA et al., 2013; FERREIRA; OLIVEIRA; TEIXEIRA, 2014; SILVA, et al., 2013).

Post-surgical radiotherapy may also be related to repercussions that will reduce the quality of life of patients, as this therapeutic resource, in addition to destroying cancer cells, causes vascular deterioration that can progress to adhesion and fibrosis between the skin and muscle tissues. of the chest wall, shoulder and supraclavicular and axillary cavity. Thus, as

VARIABLES	CATEGORY	n (11)	%
Age	≤ 50	5	45,5
	> 50	6	54,5
Schooling	Illiterate	1	9,1
	Elementary School	2	18,2
	Incomplete High School	1	9,1
	Middle school	5	45,5
	Higher	1	9,1
	Postgraduate studies	1	9,1
Profession	From home	6	54,5
	Out of the Home	5	45,5
IMC	Eutrophy (≤ 24,9 Kg/m^2)	5	45,5
	Overweight (≥ 25 e ≤ 29,9 Kg/m^2)	3	27,3
	Obesity (≥30 Kg/m^2)	3	27,3
H.A.S.	Yes	4	36,4
	No	7	63,6
Diabetes Mellitus	Yes	2	18,2
	No	9	81,8
Surgery side	Right	5	45,5
	Left	6	54,6
Axillary lymphadenectomy	Yes	11	100
	No	0	0
Types of Surgery	Mastectomia radical	8	72,7
	Serectomy / Tumorectomy	3	27,3
Radiotherapy	Yes	10	90,9
	No	1	9,1
Chemotherapy	Yes	10	90,9
	No	1	9,1
Hormone therapy	Yes	10	90,9
	No	1	9,1
Lymphedema	Yes	3	27,3
	No	8	72,7
Physiotherapeutic Treatments	Yes	1	9,1
	No	10	90,9

Table 1. Distribution of sociodemographic, clinical and treatment-related characteristics.

Source: Search data.

well as the surgical procedure, it can cause the appearance of lymphedema, repercussions on shoulder mobility, pain, fatigue and stiffness (LEAL; OLIVEIRA; CARRARA, 2016).

During the evaluation, it was also observed that only 1 (9.1%) of the patients underwent physical therapy. According to Ferreira, Oliveira and Teixeira (2014), physical therapy does not only work in rehabilitative and curative areas, but mainly in preventing complications and sequelae arising from the treatment of breast cancer. However, when there is a delay in starting physical therapy, treatment failure may occur.

In the study carried out by Jerônimo (2013), with 19 women, it was observed that onco-functional physical therapy promoted significant gains in ADM and force muscular, proving the effectiveness of physical therapy rehabilitation. Birth et al. (2012) advocate the intervention from the first postoperative day, encompassing exercises for flexion, rotation and abduction of the shoulder and later, stretching, self-drainage, noting that over the years there was a reduction in the restrictions of ADM and increased frequency of lymphedema.

Kinesiotherapy and early manual lymphatic drainage also demonstrate satisfactory results in reducing pain, gaining ROM, especially for flexion, abduction and external rotation of the limb ipsilateral to surgery, in addition to improving functional performance and reducing lymphedema (MEIRELLES et al, 2006; RETT et al., 2013).

The analysis of data from the functional assessment, referring to the range of angulations of joint movements of the homolateral and contralateral shoulders to the surgery, showed that the patients showed a statistically significant reduction in flexion ($p = 0.01$) and abduction ($p = 0.003$) movements. The Mann-Whitney U test also showed no statistically significant differences in relation to the movements of extension, horizontal adduction, internal rotation and external rotation as described in table 2.

Another aspect observed refers to the fact that even without major differences between the ranges of shoulder joint movements, when compared to each other, there were notable reductions in the abduction movements of the shoulder contralateral to the surgery when compared to the physiological ranges of

Variables	Homolateral ShoulderMd (IC95%)	Contralateral shoulderMd (IC95%)	Value of Z	*p*
Inflection	142 (131,75-159,52)	162 (158,61-172,66)	2,51	0,01*
Extension	36 (29,68-41,41)	44 (34,18-48,36)	1,35	0,18
Horizontal Adduction	32 (29,96-34,68)	34 (30,05-39,05)	1,56	0,12
Abduction	139 (110,53-149,28)	158 (150,63-171,18)	2,94	0,003*
Internal Rotation	78 (64,23-84,32)	82 (78,67-88,06)	1,18	0,24
External Rotation	78 (64,62-85,38)	86 (78,78-88,86)	1,48	0,14

**p<0,05*; *Md: median; IC95%: intervalo de confiança de 95%.*

Table 2. Comparison of ranges of motion, expressed in degrees, of the ipsilateral and contralateral shoulders to surgery (n=11).

Source: Search data.

motion expected for individuals healthy. Only 3 (27.3%) of the patients had measurements equal to 180° in the contralateral limb. The other women obtained results of reduction of this movement greater than 18°, an outcome that is very close to the limit described by Albuquerque et al (2013), of 20° of difference between the ADM from both members.

Several causes can determine joint dysfunction and influence the performance of movements in the shoulder ipsilateral to surgery in patients who have undergone therapeutic protocols for breast cancer. In this context, surgical treatment causes dysfunctions of the glenohumeral joint, especially when associated with radiotherapy, causing even more considerable repercussions when the axillary fossa also receives radiation, which can lead to fibrosis with resulting muscle tension and limitation of ADM. The type of surgery and its combination with axillary dissection, in turn, often cause a reduction in ROM and muscle strength, and possible development of lymphedema (LOPES, et al., 2009; JERÔNIMO, 2013; ZAMBORSKY, et al., 2019)

Other limiting complications reported after the surgical procedure are: the structure of the scar, the pain and the protective posture of the shoulder due to the tendency that patients develop to limit the joint movements of the ipsilateral limb to the surgery, associated with the consequent atrophy and weakness of the muscles that make up the shoulder girdle (ALBUQUERQUE et al., 2013; DIAS et al., 2017).

The shoulder flexion and abduction movements, that is, the movements of greater amplitude of the joint, are the most affected, initially for fear of scar dehiscence patients and later for the aforementioned factors. However, the main concomitant factor to the limitation is the alteration of the axillary cavity after lymphadenectomy, when local structures are removed, altering the serosity of the region and consequently the biomechanics of joint function (BREGAGNOL; DIAS, 2010; ESTEVÃO, 2018).

Corroborating the findings of this study, Albuquerque et al (2013) reported having found significant differences when comparing the ipsilateral and contralateral limbs to the procedure for flexion, extension and abduction movements, with abduction and flexion being the most affected.

Haddad et al. (2013) observed a reduction in flexion, abduction and external rotation movements and also highlighted that in the group of patients who developed lymphedema, the restriction to perform the movements was more accentuated. Gouveia et al. (2008) stated that all movements were reduced when compared with the contralateral limb, but only shoulder flexion and abduction obtained significant results.

In the study by Bregagnol and Dias (2010), there were reductions in shoulder flexion and abduction movements on the ipsilateral and contralateral sides of the surgery from the preoperative period to the immediate postoperative period, however, these measures remained reduced only on the ipsilateral side after 30 days. of the procedure. This fact can be explained due to pain, surgical scar and/or fear about moving the ipsilateral side of the procedure, also resulting in reduced movements on the contralateral side. However, these values were not later compared to the expected values in healthy individuals determined by Marques (2003).

In the analysis of the data referring to the results of the evaluation of the presence of lymphedema for the homolateral arm and forearm region, when compared to the contralateral to the surgery, there was no statistically significant relationship between

Variables	Homolateral Md (IC95%)	Contralateral Md (IC95%)	Value of Z	*p*
Arm				
05 cm	27,2 (25,13 - 31,25)	25,3 (24,20 - 30,65)	0,53	0,60
10 cm	28,8 (26,70 - 33,45)	27,9 (26,3 - 32,93)	0,20	0,85
15 cm	30,2 (27,89 - 35,2)	29,8 (27,7 - 23,89)	0,03	0,97
Forearm				
05 cm	25 (23,69-28,32)	24,9 (23,23-27,99)	0,53	0,60
10 cm	23 (21,48-25,96)	21,9 (20,81-25,53)	0,56	0,58
15 cm	20,3 (17,64-23,46)	19,6 (17,22-22,54)	0,43	0,67

Md: median; IC95%: confidence interval of 95%.

Table 3. Comparison of circumferences, expressed in centimeters, of the ipsilateral and contralateral arm and forearm to the surgery, using the cubital fossa as a reference (n=11).

Source: Research data.

lymphadenectomy and the development of lymphedema in this sample (Table 3).

Most patients, 8 (72.7%), did not present lymphedema in any region of the upper limb ipsilateral to the procedure. Among the patients who presented it, in 2 (18.2%) it was located in the arm and in 1 (9.1%) in the forearm region. The low prevalence of lymphedema and the lack of association with lymphadenectomy may have been influenced by the small sample size, which may have generated underreporting. Thus, the results must be interpreted with caution, as studies with larger samples have shown such an association (PAIVA; DUTRA, 2016; DIAS et al., 2017).

Among the most frequent complications reported in the literature in the postoperative period for the removal of breast cancer, lymphedema stands out, characterized as a chronic disease in which there is accumulation of interstitial fluid and tissue changes due to insufficiency in lymph drainage. It is assumed that, in general, it occurs around 24 to 49% in cases of mastectomy, 4 to 28% after lumpectomy associated with axillary dissection, and 5 to 34% after surgery combined with radiotherapy (HADDAD et al., 2013; REZENDE; ROCHA; GOMES, 2010). With regard to surgical treatment associated with axillary lymphadenectomy, the data of the present study corroborate the literature, being present in 27.3% of the patients. Other authors reported prevalences ranging from 34 to 86% (LOPES et al, 2009; PAIVA; DUTRA, 2016).

It is assumed that the main risk factors for the appearance of lymphedema are the extension of axillary lymphadenectomy and its association with radiotherapy in the axilla region, which lead to obstruction of lymphatic drainage in the limb. However, axillary dissection as a cause of complications is still controversial, with an association between 15 and 20% of cases being pointed out (PAIVA et al., 2011; VALADARES et al., 2016).

Jerônimo (2013) presented a prevalence of lymphedema in 21.4% of his sample, in which the radical extirpation of the tumor and axillary lymphadenectomy prevailed, being demonstrated in 60 and 84% of the cases, respectively. These findings support those

found in this study, where radical mastectomy also prevailed as the main surgical modality for tumor removal and all procedures were associated with axillary lymphadenectomy.

In disagreement, Albuquerque et al (2013) observed lymphedema as the most prevalent complication, affecting 59.2% of the sample, 74% of whom underwent radical mastectomy and the entire sample underwent axillary dissection. Bergmann, Mattos and Koifman (2007) stated that the lack of standardization in studies that evaluated the prevalence of lymphedema, such as the points used as a reference (olecranon or cubital fossa) and the distance taken from it in centimeters, may be responsible for the high variation between the results found, impairing the comparison between them and preventing the determination of the real numbers of incidence and prevalence of this disorder.

CONCLUSION

In view of the results, it can be concluded that radical mastectomy is the most performed surgical modality in women with breast cancer.

Regardless of the surgical modality used, when associated with axillary lymphadenectomy, there are reductions in the range of flexion and abduction movements of the shoulder homolateral to the surgery, even if lymphedema has not developed.

REFERENCES

ALBUQUERQUE, V. T. et al. **Funcionalidade de membros superiores em mulheres após cirurgia para câncer de mama.** Goiânia: Pontifícia Universidade Católica de Goiás; 2013.

AZEVEDO, A. et al. O conhecimento de mulheres cuidado do rastreamento do câncer de mama e suas consequências. **Revista de Medicina.** v. 98, n. 3, pág. 187-193, 2019.

BARBOSA, J. A. N. et al. Avaliação da Postura Corporal em Mulheres com Câncer de Mama. **Revista Brasileira de Ginecologia e Obstetrícia**, v. 35, n. 5, p. 215-220, 2013.

BATISTON, A. P. et al. Conhecimento e prática sobre os fatores de risco para o câncer de mama entre mulheres de 40 a 69 anos. **Revista Brasileira de Saúde Materno Infantil**, v.11, n. 2, p. 163-171, 2011.

BELEZA, A. C. S. et al. Alterações posturais em mulheres submetidas à cirurgia para retirada do câncer de mama. **ABCS Health Sciences**, v. 41, n. 1, 2016.

BERGMANN, A.; MATTOS, I. E.; KOIFMAN, R. J. Incidência e prevalência de linfedema após tratamento cirúrgico do câncer de mama: revisão de literatura. **Revista Brasileira de Cancerologia**, v. 53, n. 4, p. 461-70, 2007.

BREGAGNOL, R. K; DIAS, A. S. Alterações funcionais em mulheres submetidas à cirurgia de mama com linfadenectomia axilar total. **Revista Brasileira de Cancerologia**, v. 56, n. 1, p. 25-33, 2010.

DIAS, M. et al. Implicações das cirurgias de câncer de mama nas atividades profissionais. **Cadernos Brasileiros de Terapia Ocupacional**, v. 25, n. 2, p. 325-332, 2017.

ESTEVÃO, A. et al. Exercícios imediatos versus exercícios tardios no pós-operatório de cirurgias oncomamárias: limitação ou liberação da amplitude de movimento? Revista Brasileira de Cancerologia, v. 64, n. 4, p. 551-560, 2018.

FERREIRA, T. C. R.; OLIVEIRA, E. S. P.; TEIXEIRA, E. S. Atuação da fisioterapia no pós-operatório de mastectomia. Revisão sistemática. **Revista da Universidade Vale Rio Verde**, Três Corações, v. 12, n. 2, p. 765-776, 2014.

GOUVEIA, P. F. et al. Avaliação da amplitude de movimento e força da cintura escapular em pacientes de pós-operatório tardio de mastectomia radical modificada. **Fisioterapia e Pesquisa**, v. 15, n. 2, p. 172-176, 2008.

HADDAD, C. A. S. et al. Avaliação da postura e dos movimentos articulares dos membros superiores de pacientes pós-mastectomia e linfadenectomia. **Einstein (São Paulo)**, v. 11, n. 4. P. 426-434, 2013.

INCA-INSTITUTO NACIONAL DO CÂNCER. Estimativa 2020: incidência de câncer no Brasil. Rio de Janeiro: INCA, 2020. Disponível em: <http://www.inca.gov.br/estimativa/20 20/sintese-de-resultados-comentarios.asp>. Acesso em: 06 de Dezembro de 2021.

JERÔNIMO, A. F. A. **Efeitos da cinesioterapia na força muscular e amplitude de movimento em mulheres mastectomizadas.** 2013. Trabalho de Conclusão de Curso (Bacharelado em Fisioterapia) – Universidade Estadual da Paraíba; Campina Grande, 2013.

LEAL, N. F. B. S.; OLIVEIRA, H. F.; CARRARA, H. H. A. Fisioterapia supervisionada nas mulheres em radioterapia para o câncer de mama. **Revista Latino-Americana de Enfermagem**, v.24, p.1-8, 2016.

LOPES, L. S. et al. Avaliação do complexo do ombro em mulheres submetidas à intervenção cirúrgica para tratamento de câncer de mama. **Arquivos de Ciências da Saúde da UNIPAR**, v.13, n.2, 2009.

MARQUES, A. P. **Manual de Goniometria**. 2 ed. São Paulo: Manole, 2003.

MEIRELLES, M. C. C. C. et al. Avaliação de técnicas fisioterapêuticas no tratamento do linfedema pós-cirurgia de mama em mulheres. **Revista Brasileira de Fisioterapia**, v. 10, n. 4, 2006.

MINISTÉRIO DA SAÚDE. IMC em adultos. Brasília: 2017. Disponível em: <http://portalms. saude.gov.br/component/content/article/804-imc/40509-imc-em-adultos>. Acesso em: 18 de Outubro de 2018.

NASCIMENTO, S. L. et al. Complicações e condutas fisioterapêuticas após cirurgia por câncer de mama: estudo retrospectivo. **Fisioterapia e Pesquisa**, v. 19, n. 3, p. 248-255, 2012.

PAIVA, C. B.; DUTRA, C. M. S. Prevalência de linfedema após tratamento de câncer de mama em pacientes com sobrepeso. **Fisioterapia e Pesquisa**, v. 23, n. 3, p. 263-267, 2016.

PAIVA, D. M. F. et al. Fatores associados ao linfedema em pacientes com câncer de mama. **Revista Brasileira de Ginecologia e Obstetrícia**, v. 33, n. 2, p. 75-80, 2011.

PAPA, A.M. et al. Impacto da obesidade no prognóstico do câncer de mama. **Revista Brasileira de Oncologia Clínica.** v. 9, n. 31, 2013.

RETT, M. T. et al. Efeito da fisioterapia no desempenho funcional do membro superior no pós-operatório de câncer de mama. **Revista Ciência & Saúde**, v. 6, n. 1, p. 18-24, 2013.

REZENDE, L. F.; ROCHA, A. V. R.; GOMES, C. S. Avaliação dos fatores de risco no linfedema pós-tratamento de câncer de mama. **Jornal Vascular Brasileiro**, v. 9, n. 4, 2010.

RODRIGUES, R. M. **Impacto da mastectomia radical na sexualidade feminina.** 2015. Trabalho de Conclusão de Curso (Bacharelado em Fisioterapia) – Universidade Estadual da Paraíba; Campina Grande, 2015.

SILVA, M. D. et al. Qualidade de vida e movimento do ombro no pós-operatório de câncer de mama: um enfoque da fisioterapia. **Revista Brasileira de Cancerologia (Online),** v. 59, n. 3, p. 419-426, 2013.

SILVA, P. A; RIUL, S. S. Câncer de mama: fatores de risco e detecção precoce. **Revista Brasileira de Enfermagem**, v. 64, n. 6, 2012.

SOUZA, N. A. M.; SOUZA, E. S. F. Atuação da fisioterapia nas complicações do pós-operatório de câncer de mama: uma revisão de literatura. **Revista Uningá**, v. 40, n. 1, 2014.

VALADARES, S. L. et al. Esvaziamento axilar: um procedimento em desuso? **Acta Obstétrica e Ginecológica Portuguesa**, v. 10, n. 3, p. 230-239, 2016.

VALINOTE, S. P. A. et al. Alterações venosas e linfáticas em mulheres com linfedema após linfadenectomia axilar no tratamento do câncer de mama. **Revista Brasileira de Ginecologia e Obstetrícia**, v. 35, n. 4, p. 171-177, 2013.

YAZICI, O. et al. The effect of obesity on recurrence pattern in early breast cancer patients. **J BUON**, v. 20, n. 4, p. 954-62, 2015.

ZAMBORSKY, B. T. et al. Métodos fisioterapêuticos para linfedema em mulheres mastectomizadas: revisão de literatura. **Revista Saúde Viva Multidisciplinar da AJES**, v. 2, n. 2, 2019.