

Effect of Early Physical Therapy of the Upper Arm on Recovery Post-operative Mastectomy Patients in Medan City Hospital, Indonesia

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ABSTRACT

OBJECTIVE: This study aims to assess upper ipsilateral limb function clinically as well as the effects of specific post-surgical complications that arise following mastectomy by either intervening with an early rehabilitation program or not. To look at the physical morbidity following surgery and sentinel lymph node dissection (SLND/axillary lymph node dissection, ALND).

METHODOLOGY: This study used samples of 40 post-operative mastectomies, with 20 in each Group taken using a non-probability consecutive sampling technique. The data were gathered using an observational sheet on physical therapy; bivariate analysis was used, and the Whitney test was used to analyze the upper arm condition in the control and intervention groups pre- and post-early physical therapy intervention.

RESULT: This study showed the influence of early physical therapy of the upper arm on recovery post-operative mastectomy patients at p-value = 0.000 (p < 0.05).

CONCLUSION: Multifactorial physical therapy (i.e. stretching, exercises) and active exercises were practical to treat post-operative pain and impaired ROM after treatment for breast cancer, so early physical therapy can improve function disabilities without causing post-operative complications. It is concluded that early physical therapy intervention following a mastectomy can reduce the adverse effects of the procedure, including shoulder immobility recovery. Patients with breast cancer should be advised to undergo early rehabilitation following a mastectomy, thereby decreasing their length of immobilization.

KEYWORDS: physical therapy, upper arm, post-operative, mastectomy

INTRODUCTION

Incidences of breast cancer in the last forty years have increased by 0.05 annually (from 2010 to 2019), with localized-stage and hormone receptor-positive illness being the main drivers of this growth. On the other hand, the death rates from breast cancer have been falling since 1989, albeit more slowly in the last years (1.3% per year from 2011 to 2020) than in the preceding ten years (1.9% per year from 2002 to 2011)³ and besides the death rate of breast cancer decreased by 43% overall from 1989-2020 years⁴. According to WHO 2018, BC is one of the most common malignant tumours in women⁷, although men can get BC. Every year, a new cancer worldwide is breast cancer³, and most patients with BC are aged 15-49 years^{12,13}. Mortality of BC can decrease by early screening, diagnosis and treatment standardization and raise the five-year survival rate, so overall 5-year survival rates of stage I, II and III patients were 98%, 92% and 75% respectively⁵. Radical surgery

supplemented by chemotherapy, radiotherapy, endocrine therapy and other therapies² is the primary treatment for BC. Radiation therapy for breast cancer (BC) mainly consists of sentinel lymph node biopsy, axillary lymph node dissection, simple mastectomy, breast-conserving surgery, and BC standard radical surgery (Halsted surgery).

Although BC treatment has moved from extensive radical resection to less invasive treatment, post-operative complications still occur, primarily in the form of lymphedema, pain, and upper limb dysfunction. These complications significantly negatively impact the quality of life for patients⁸, in addition to the retention of lymph in the tissue space and its subsequent pathological and clinical changes, such as tissue swelling, persistent inflammation, and even tissue fibrosis at relevant locations, which can result in secondary oedema of the affected upper limb¹. The leading causes of lymphedema are the loss or blockage of lymphatic vessels caused by the surgery; this is why breast cancer is the most common cancer among women worldwide. In their lives, 1 in 8 women may receive a diagnosis of aggressive breast cancer, according to data from 2018. The way that breast cancer is treated is constantly changing. Fortunately, survival rates are rising, likely due to early discovery and better, tailored treatment. For many

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years, surgery has been the cornerstone of treatment for breast cancer⁵.

In many cases, it is the only treatment available for early-stage breast cancer to accurately diagnose, stage, and treat patients with breast cancer. The occurrence and development of post-operative pain are related to many factors, such as surgical injury, age, psychosocial factors, genetic factors, and neurosensitization⁷. The incidence of shoulder motion disorder after breast cancer surgery was 2% ~ 51%¹³. The inactivity of post-operative patients' upper limbs and shoulder joints as a result of pain phobia and wound healing complications frequently results in reduced activity and impaired function of the afflicted limbs²¹. Physical therapy is one of the measures that can be used for sprains and strains, back and neck pain, shoulder instability, ankle pain and instability, foot pain, sports injuries, work-related injuries, dizziness, pre and post-surgical rehabilitation, incontinence, pre and post-pregnancy pain, arthritis, osteoporosis, and weight-bearing limitations are just a few of the many conditions that physical therapy can help⁹; this is not an exhaustive list because there are many different ways that physical therapy can assist someone in regaining their function. Although physical therapy is frequently seen as a last resort before surgery, early intervention can not only help a patient manage their pain but also reduce the overall cost of any medical care they may require, including testing, prescription medication, and follow-up doctor. In addition to improving function more quickly and enabling a person to resume a more fulfilling life¹⁶, early physical therapy intervention can hasten the healing process by reducing the time the body can compensate. So, if surgery is indicated, it will also allow the muscles to stay toned and firm, making the post-surgical recovery easier. The objective of this study was to know the effect of early physical therapy of the upper arm on recovery from post-operative mastectomy⁷.

METHODOLOGY

Study Design

This study used a quasi-experimental design with a pre and post-test control group design approach. The research location was carried out at the patient's home after post-mastectomy. A mastectomy without reconstruction usually takes 1 to 3 hours. In this research, patients do physical therapy after mastectomy; the researcher found the sample in the hospital and then made an appointment to meet at their home.

Each woman got breast cancer, and the mastectomy was assessed preoperatively before randomization and then postoperatively at day seven after the respondent agreed to make physical therapy; the research team did the exercise physical therapy for one month and then continued for three months (a total of four months). Prospective documentation during the research, such as lymphedema,

dysfunction of the upper arm, and all of the related after mastectomy, was checked. Then, the researcher made a percentage of how effective physical therapy was. The instruments used in this study are checklist instruments for each activity and ROM. This research was conducted during May 2022 - March 2023

Population and Sample

The population in this study were patients who performed a mastectomy, after which a sample size was carried out, and 40 people were divided into case and control groups. Researchers made a selection according to predetermined criteria, namely post-mastectomy patients who can communicate well, without complications and are willing to cooperate in physical therapy. For the sample of 40 respondents who underwent mastectomy, data collection in this study was carried out in two stages, namely the preparation and implementation stages. The implementation stage takes after the mastectomy and is observed by the sheet.

Instrument

Data measurement methods in this study include demographic questionnaire sheets and observation sheets by checklist. This validity test was carried out, where the calculation result. The validity test was 0.8845, and the instrument was tested using the Alfa Cronbach technique, where the results showed that the reliability coefficient of the questionnaire was 0.891 (reliable).

Data Analysis

The demographic data used the percentage for the case and control group, and physical therapy data used the percentage of each activity for four months (one month, then three months, a total of 4 months), where every week was analyzed. In the first month, physical therapy was explained by the number and percentage of each Group. Each variable was presented using tables and interpreted based on the results obtained. Data analyses use Mann-Whitney for upper arm therapy in case and control groups. The researcher took the data collection after the mastectomy, and the respondent went home. The data was analyzed using the Mann-Whitney test because the data was not normally distributed, and the sample was small.

Ethical Statement

The data collection procedure was carried out after the researcher finished conducting a proposal seminar and presented a request for permission to conduct research in the educational institution (Faculty of Nursing USU) after obtaining an application for permission to conduct the research. Furthermore, the researcher sent a research permit application to the Medan city government, and a letter of permission was issued. The number of ethics clearances is 3001/III/SP/2022.

RESULTS

The data of respondents examined in this study are age and education. Based on the results of research

from 40 respondents. The data were taken in respondent homes four months after mastectomy. It was found that most respondents were 36 - 45 years old, namely as many as 20 people (50.7%), aged 26-35 years, and as many as 15 people (37.5%). The highest education is high school, 25 people (62.5%)

Table I.

Table I: Demographic data of Respondents (n= 40)

Characteristics	f	%
Gender		
Female	40	100
Age (Years) (23)		
26-35 (Early Adult)	15	37.5
36-45 (Late Adult)	20	50
46-55 (Early Elder)	5	12.5
Education		
Primary School	5	12.5
Junior High School	10	25
High School	25	62.5

In **Table II**, it can be seen that respondents with cases experienced an increase in treatment from the first month to the fourth month. Respondents No. 1-5 only experienced a 0.8% increase in physical activity, but after four months of therapy, they experienced a 30% increase. In this study, researchers started from 1 to 4 months and calculated it in 4 months (1 month first, three months second, total four months).

Table II: Data on Early Physical Therapy of the Upper Arm on Recovery post-operative Mastectomy Patients in Medan City Hospital before the start of the Treatment and during four months of treatment (n= 20)

Patient	Before Treatment	One month	Four month
1-5	0.8%	15%	30%
6-10	0.5%	20%	40%
11- 15	0.7%	16%	25%
16 - 20	10%	30%	60%

Patients who did not perform early physical therapy experienced a slight increase in upper arm function of 22% after four months post-mastectomy. In this study, researchers started from 1 to 4 months and calculated it in 4 months (1 month first, three months second, total four months).

Table IV shows mastectomy patients in the control group did not show a significant increase in upper arm exercise.

Table V shows the results of the Mann-Whitney test on Early Physical Therapy of the Upper Arm on recovery Post-operative Mastectomy during four months of Treatment case, and the control group obtained a significance value of 0.001 ($p < 0.05$); it can

be interpreted that there is a difference between the intervention group and the control group after being given the Physical Therapy of the Upper Arm intervention.

Table III: Data on Early Physical Therapy of the Upper Arm on Recovery Post-operative Mastectomy Patients in Medan City Hospital during four months of treatment (n= 20)

Patient	One month Case	Four month Case
1-5	13.8 %	22%
6-10	8%	21%
11- 15	12%	15%
16 - 20	11%	21%

Table IV: Data on Early Physical Therapy of the Upper Arm on Recovery Post-operative Mastectomy Patients in Medan City Hospital (n = 20) during four months of Treatment Control Group (n = 20)

Patient	One month Case	Four month Case
1-5	10%	10%
6-10	8%	9%
11- 15	7%	7%
16 - 20	6%	6 %

Table V: Data on Early Physical Therapy of the Upper Arm on Recovery post-operative Mastectomy Patients in Medan City Hospital during four months of Treatment case and control group (n= 40)

Physical Therapy of the Upper Arm	<i>P</i>
Case Group	0.001
Control Group	

DISCUSSION

In this study, the research team conducted four months of exercise, where in the first week of the first month of mastectomy, respondents performed physical therapy starting with relaxing both upper extremities. Before the treatment, the research team gave an example of the therapy for 10 minutes. After that, the team performed physical therapy on the upper arm for the first 15 minutes, and we evaluated it. If the respondent could follow it well, the research team scheduled the therapy the next day, doing this exercise for 30 minutes every day. After all of the procedures were done well, the team researcher made a one-month schedule and a checklist sheet for how far the movement had affected upper arm activity by percentage. After one month of running and evaluation, the respondent was asked to do physical therapy for four months to avoid upper arm dysfunction. Then, the team researcher evaluates the

percentage by checking the list. In the beginning, 60 respondents met the criteria. Still, there were several reasons until there were only 20 respondents as their houses were far away, so the recommendation was that the check could be done at the nearest hospital; the respondent refused to worry about loose stitches. Currently, increasingly diversified rehabilitation exercises are being used. The methods include resistance, shoulder and elbow movement, lymphatic drainage, aerobic exercise, physiotherapy, and massage. This physical therapy is often used to promote recovery after post-mastectomy. Exercise is essential because some evidence indicates that early physical therapy helps improve shoulder range of motion⁹. However, another study with 28 researchers found no correlation between exercise and improved shoulder range of motion². It has been discovered in recent years that weight training reduces pain. Although earlier research has shown that resistance movements are effective¹⁰, other studies have shown that these interventions have not produced statistically significant results. Researchers hypothesize that this could be due to resistance exercise interventions being too mildly intense or having different exercise content, which could have varying effects.

Consequently, it is currently unknown how different exercise regimens would affect post-operative problems related to breast cancer¹⁴. Exercise for the shoulders and elbows was compared with no exercise to see if it affected the incidence of arm lymphedema. The workout group for the elbows and shoulders consisted of 338 participants, while the control group consisted of 254 persons. Exercise with arm lymphedema was less common in patients who exercised their shoulders and elbows (RR = 0.343, 95% CI = 0.207–0.569, $p = .000$, I² = 12.846) because post-operative complications of breast cancer have a high incidence, such as lymphedema, dysfunction shoulder and elbow so many exercise approaches have been used to reduce the impact of complications after mastectomy. Regarding the effect of exercise on muscle strength, we can make treatment for patients, such as physical therapy after post-mastectomy. According to the current study, most participants had increased muscle strength due to activities preventing muscle atrophy joint contractures and improved lymph and blood circulation over the four months following mastectomy. This result is consistent with reports indicating exercise was beneficial in enhancing limb strength, shoulder mobility, and wound healing²⁰.

The current study showed that the Group significantly reduced upper limb impairments more than the control group. This result is consistent with their report on the benefits of starting an exercise program early following a mastectomy²¹. Beginning on the first post-operative day, the experimental Group significantly improved their range of motion and functional abilities

score after exercising, indicating less disability than the control group. Despite advancements in medical therapy, the 5-year survival rate for women diagnosed with breast cancer is 89%; nonetheless, certain curative medications include side effects that impede physical function⁹. Patients receiving therapy for breast cancer are prone to shoulder and arm morbidity, which includes discomfort, axillary web syndrome, cording, and loss of range of motion (ROM), as well as lymphedema^{11,12}. Due to these impairments, this condition may make it difficult for women to carry out daily tasks like lifting, carrying, and overhead reaching. Women who experience these attenuations after treatment also tend to have poorer activity tolerance and a lower quality of life¹⁵. Treatment for early-stage breast cancer usually lasts up to a year. Women are subjected to a range of treatment techniques during this period, including radiation therapy, chemotherapy, surgery, and reconstructive surgery, all of which may worsen arm function. Inevitable unfavourable consequences lead to premature impairments of the arms and shoulders, while others manifest months or even years after the treatment is discontinued. Nevertheless, rehabilitation interventions implemented during breast cancer treatment have been demonstrated to mitigate arm and shoulder morbidity.

Even though studies indicate that physical impairments linked to breast cancer are less common, it is nevertheless vital to have physical therapy early on to protect and restore arm and shoulder function. It is best to start physical therapy as soon as possible following surgery to preserve and restore arm and shoulder mobility to lower overall morbidity¹⁸. Loh SY 2015²⁰ performed a systematic review of randomized trials examining the efficacy of exercise to reduce shoulder and upper extremity morbidity throughout treatment to ascertain the effectiveness of physical therapy intervention in the treatment of the upper extremity during breast cancer treatment.

CONCLUSION

Early Physical therapy after mastectomy, along with elbow and shoulder exercises, is one of the greatest strategies to increase motion in the Rom, especially of the shoulder joint. A simple exercise can address the patient with upper limb problems, and physical therapy for the elbows and shoulders should be prioritized to prevent lymphedema.

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AUTHOR CONTRIBUTION

Sitepu NF: Article writing, data collection, research development

Gurning L: Reviewing research concepts and editing.

Rosaulina M: Responsible for identifying supporting articles related to the manuscript and data collection.

Sinaga M: Supervised article writing process and data analysis.

REFERENCES

1. Armer JM, Heckathorn PW. Post-breast cancer lymphedema in aging women: self-management and implications for nursing. *J Gerontol Nurs.* 2005; 31(5): 29-39. doi: 10.3928/0098-9134-20050501-07.
2. Bartsch HH, Weis J, Moser MT. Cancer-related fatigue in patients attending oncological rehabilitation programs: prevalence, patterns and predictors. *Onkologie.* 2003; 26(1): 51-7. doi: 10.1159/000069864.
3. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.* 2018; 68(6): 394-424. doi: 10.3322/caac.21492.
4. DeSantis CE, Ma J, Gaudet MM, Newman LA, Miller KD, Sauer AG et al. Breast cancer statistics, 2019. *CA Cancer J Clin.* 2019 Nov; 69(6): 438-451. doi: 10.3322/caac.21583.
5. Costaz H, Rouffiac M, Boule D, Arnould L, Beltjens F, Desmoulins I et al. Strategies in case of metastatic sentinel lymph node in breast cancer. *Bull Cancer.* 2020 Jun; 107(6): 672-685. doi: 10.1016/j.bulcan.2019.09.005.
6. DeSantis C, Siegel R, Bandi P, Jemal A. Breast cancer statistics. *CA Cancer J Clin.* 2011; 61(6): 409-418. doi: 10.3322/caac.20134.
7. Grebić D, Pirjavec A, Kustić D, Klarica G, Gembić T. Surgical treatment for breast cancer and axillary metastases: Historical perspective. *Acta Med Hist Adriat.* 2021; 19(1): 125-136. doi: 10.31952/amha.19.1.7.
8. Hendrick RE, Helvie MA, Monticciolo DL. Breast cancer mortality rates have stopped declining in US women younger than 40 years. *Radiology.* 2021; 299(1): 143-9. doi: 10.1148/radiol.2021203476.
9. Huang YY, Toh PY, Hunt C, Lin J, Kamyab R, Ponniah AK. Breast cancer treatment-related arm lymphoedema and morbidity: A 6-year experience in an Australian tertiary breast Centre. *Asia-Pac J Clin Oncol.* 2022; 18(1): 109-117. doi: 10.1111/ajco.13523.
10. Hayes SC, Rye S, Disipio T, Yates P, Bashford J, Pyke C et al. Exercise for health: A randomized, controlled trial evaluating the impact of a pragmatic, translational exercise intervention on the quality of life, function and treatment-related side effects following breast cancer. *Breast Cancer Res Treat.* 2013; 137(1): 175-186. doi: 10.1007/s10549-012-2331-y.
11. Karki A, Simonen R, Malkia E, Selfe J. Impairments, activity limitations and participation restrictions 6 and 12 months after breast cancer operation. *J Rehabil Med.* 2005; 37(3): 180-188. doi: 10.1080/16501970410024181.
12. Kjaer TK, Johansen C, Ibfelt E, Christensen J, Rottman N, Hoybye MT et al. Impact of symptom burden on health related quality of life of cancer survivors in a Danish cancer rehabilitation program: a longitudinal study. *Acta Oncol.* 2011; 50(2): 223-32. doi: 10.3109/0284186X.2010.530689.
13. Lippi G, Mattiuzzi C, Cervellin G. Is digital epidemiology the future of clinical epidemiology? *J Epidemiol Glob Health.* 2019; 9(2): 146. doi: 10.2991/jegh.k.190314.003.
14. Montagnana M, Lippi G. Cancer diagnostics: current concepts and future perspectives. *Ann Transl Med.* 2017; 5(13): 268. doi: 10.21037/atm.2017.06.20.
15. Nesvold IL, Reinertsen KV, Fosså SD, Dahl AA. The relation between arm/shoulder problems and quality of life in breast cancer survivors: a cross-sectional and longitudinal study. *J Cancer Surviv.* 2011; 5(1): 62-72. doi: 10.1007/s11764-010-0156-4.
16. Narod SA, Iqbal J, Miller AB. Why have breast cancer mortality rates declined? *J Cancer Policy.* 2015; 5: 8-17. doi: 10.1016/j.jcpo.2015.03.002.
17. Nelson JA, Rubenstein RN, Haglich K, Chu JJ, Yin S, Stern CS et al. Analysis of a Trend Reversal in US Lumpectomy Rates from 2005 Through 2017 Using 3 Nationwide Data Sets. *JAMA Surg.* 2022; 157(8): 702-711. doi: 10.1001/jamasurg.2022.2065.
18. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.* 2021; 71(3): 209-249. doi: 10.3322/caac.21660.
19. NCI Surveillance, Epidemiology, and End Results Program. Breast Schema for 1988-2015 based on

- AJCC 6th Edition. Available from: <https://seer.cancer.gov/seerstat/variables/seer/ajcc-stage/6th/breast.html>
20. Loh SY, Musa AN. Methods to improve rehabilitation of patients following breast cancer surgery: a review of systematic reviews. *Breast Cancer* (Dove Med Press). 2015; 7: 81-98. doi: 10.2147/BCTT.S47012.
 21. Santaella CL, Ana Gómez C, Burch A. Feasibility of an Exercise Program for Puer Rican Women who are Breast Cancer Survivors. *Rehabil Oncol*. 2008 Apr 1; 26(2): 20-31. doi: 10.1001/jaba.2008.26-20.
 22. Dams L, Van der Gucht E, Haenen V, Lauwers M, De Pauw S, Steurs T et al. Biopsychosocial risk factors for pain and pain-related disability 1 year after surgery for breast cancer. *Support Care Cancer*. 2022; 30(5): 4465–4475. doi: 10.1007/s00520-022-06805-0.
 23. Zou L, Liu FH, Shen PP, Hu Y, Liu XQ, Xu YY et al. The incidence and risk factors of related lymphedema for breast cancer survivors post-operation: A 2-year follow-up prospective cohort study. *Breast Cancer*. 2018; 25(3): 309-314. doi: 10.1007/s12282-018-0830-3.

