



EFFECT OF ACTIVE CYCLE BREATHING TECHNIQUE ON PAIN, CHEST EXPANSION AND UPPER EXTREMITY FUNCTIONAL ACTIVITY IN POST SURGICAL MASTECTOMY INDIVIDUALS

Physiotherapy

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ABSTRACT

Background: Patients with breast cancer may undergo surgery called a mastectomy. Post-surgical mastectomy often leads to pain, reduced chest expansion and shoulder mobility, postural issues, and lymphedema, affecting upper limb function. While numerous studies focus on lymphedema treatment, few examine physiotherapy's benefits for postoperative pain, shoulder mobility, and posture. Previous studies indicate that the active cycle breathing technique improves pulmonary function, prompting us to include it in our study. Our aim is to investigate the effectiveness of active cycle breathing (ACBT) in enhancing lung function in post-surgical mastectomy patients. **Objectives:** This study evaluates the effects of the Active Cycle Breathing Technique (ACBT) on pain levels, chest expansion, and Upper Extremity Functional Index (UEFI) in post-surgical mastectomy individuals. **Methodology And Outcome Measures:** Thirty post-surgical mastectomy patients were enrolled in this pre- and post-test experimental study based on predetermined inclusion and exclusion criteria. Subsequently, participants were evaluated for pain, chest expansion, and upper extremity function using the Numerical Pain Rating Scale (NPRS), measuring tape, and Upper Extremity Functional Index (UEFI) both before and after receiving physiotherapy treatment until discharge. **Results:** In this study, every parameter had a statistically significant value ($p = 0.001$). **Conclusion:** The present study concluded that ACBT is a well-tolerated and accepted airway clearance technique. It is more effective in post-surgical mastectomy individuals to reduce pain, improve chest expansion, and upper extremity functional capacity.

KEYWORDS

Post-surgical mastectomy, Active Cycle Breathing Technique (ACBT), pain, chest expansion, Numerical Pain Rating Scale (NPRS), Upper Extremity Functional Index (UEFI).

INTRODUCTION

Cancer is the term used for diseases in which abnormal cells divide without control and are able to invade other tissues. Cancer can start almost anywhere in the human body, which is made up of trillions of cells⁽¹⁾

Milk-producing glands are located anatomically in front of the chest wall in the breast. They rest on the Pectoralis major muscle, and the breast is supported and attached to the chest wall by ligaments. One kind of cancer that begins in the breast is called breast cancer. It may begin in one breast or both. When cells start to proliferate uncontrollably, cancer is born. Although men can also develop breast cancer, women account for the majority of cases of the disease.⁽²⁾

As of late, BC has emerged as the world's fifth most common cause of death overall and the primary cause of cancer-related deaths among women. In 2020, BC was responsible for 6.9% of all cancer-related fatalities worldwide.⁽³⁾

A mastectomy is a surgical procedure involving the removal of all or part of the breast. A breast cancerous condition is the most common reason for a mastectomy.⁽⁴⁾

METHODOLOGY

Study Method:

- Study design : pre and post-experimental design
- Study set up : Department of physiotherapy
- Sample size : 30
- Subjects age between : 40 to 70 years
- Type of study : pre and post experimental design
- Sample method : convenient sampling

Inclusion Criteria:

- Gender : females
- Age : 40 to 70 years
- Patients with unilateral mastectomy
- Cooperative Patients
- Modified radical mastectomy

Exclusion Criteria :

- Age group below 40 years and above 70 years
- Patients under radiation therapy
- Past medical history of any cardiac and respiratory diseases
- Fractures around the chest wall

- Any previous upper thoracic surgeries.
- individuals with any psychological problems.
- Individuals who underwent bilateral mastectomy.
- Individuals with other neuromuscular disorders.

Outcome Measures:

- Chest Expansion: A fabric tape was used to measure the expansion of the chest at two distinct ribcage levels i.e., upper and lower rib cage.
- NPRS: Used to measure the pain level.
- Upper Extremity Functional Index (UEFI): The Upper Extremity Functional Index (UEFI) was created as a uniform, clinically effective way to quantify the limits of upper extremity activity.

Study Procedure:

The study was conducted in the surgical oncology department SVIMS and the ethical clearance was obtained from the institutional ethics committee (CODE:1553).

- Individuals who fulfill the inclusion criteria and are willing to participate were included in the study after obtaining an informed consent.
- Regular anthropometric measurements were assessed at the beginning of the study. Following the above initial data, after assuming proper resting status of the patient, the patient was assessed first (chest expansion, NPRS and upper extremity functional index) at 1st POP Day and then, physiotherapy treatment was given.
- After intervention, again measurements were reassessed (chest expansion, NPRS and upper extremity functional index) at the time of discharge and recorded.
- The treatment started on the 1st day of surgery and continued until the day of discharge.
- The treatment was continued along with routine physical therapy care. Exercises were initiated when the drain tubes and sutures were still in place. The treatment/intervention were performed thrice in a day.

TREATMENT PROTOCOL:

Active Cycle Breathing Technique (ACBT)

ACBT (active cycle breathing technique): A complete ACBT consists of 3 phases

1. Breath control – 3 counts up to 20 to 30 seconds.
2. Chest expansion exercises – 3 thoracic expansion exercises.

3. Forced expiratory techniques – 2 huffs at mid to low lung volumes.

- They received the intervention at bedside 3times daily from 1st post operative day.Each intervention lasted for about 10–15min.
- Individuals were encouraged to repeat three cycles of training for 10–15min per cycle and complete at least 3 ACBT training sessions daily.

Statistical Analysis:

Individual data will be analyzed by intension to treat all continuous data will be assessed for normality. Continuous data will be described using mean (SD), If normally distributed using median (IQR)when the distribution is skewed. Discontinuous outcomes will be presented as risk ratios with 95%confidence intervals using **paired T-TEST**

- Difference in the outcome will be compared within the group.
- The “p” value of this study is <0.01

RESULT:

The results were analyzed using SPSS 21.version for the statistical analysis of the study. In the present study, a total of 30 individuals were included who fulfilled inclusion criteria. Out of 30 individuals 18 were operated with left mastectomy and 12 were operated right mastectomy.

Table 1: Demographic Data – Age And BMI (descriptive Statistics)

Demographic Data	Mean	SD	P Value
Age	51.67	6.37	0.71
BMI (Kg/M2)	26.91	1.49	0.62

Table 2: Pre And Post Mean Values Of NPRS, Chest Expansion, And UEFI

Variables		Mean	N	SD
Pain	pre	7.17	30	1.05
	post	3.80	30	0.66
Chest Expansion - Axillary Level	pre	0.87	30	0.41
	post	2.07	30	0.50
Chest Expansion - Xiphoid Level	Pre	0.68	30	0.30
	post	1.37	30	0.45
UEFI	pre	28.53	30	3.59
	post	38.43	30	3.32

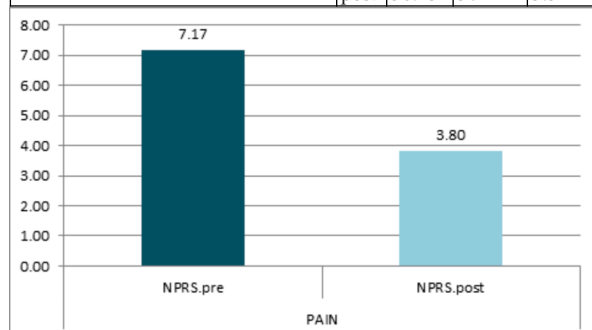


Fig 1:

Graphical representation of pre and post mean values of pain by using NPRS, pain is controlled after intervention.

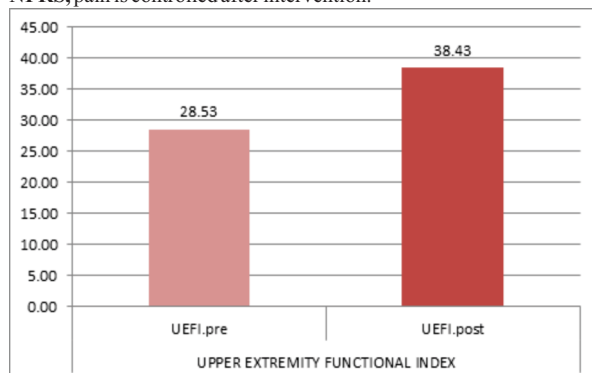


Fig 2:

Graphical Representation of pre and post values of UEFI, upper extremity function was improved after intervention

Table 3: The Below Table Explained About The Paired Differences.

	Paired Differences				t	df	Sig. (2-tailed)
	Mean	Std. Deviation	95% Confidence Interval of the Difference				
			Lower	Upper			
Pain pre and post	3.36	0.92	3.02	3.71	19.87	29	0.001
Chest. exp. Ax. pre -post	-1.20	0.73	-1.47	-0.92	-8.90	29	0.001
Chest.exp.Xph. pre and post	-0.68	0.50	-0.86	-0.49	-7.49	29	0.001
UEFI.pre -post	-9.90	4.02	-11.40	-11.40	-13.48	29	0.001

Table represents that the Pain, chest expansion and UEFI of all the subjects (n=30)in the present study demonstrated statistically significant (P<0.001).Which justifies the clinical improvement in the NPRS,UEFI, and chest expansion(table 3).

DISCUSSION:

The present study is carried to find out the effect of ACBT on pain, chest expansion, and upper extremity function in post surgical mastectomy individuals, in single group pre test post test design.

30 participants in all are part of the study; they are all in the same group and are all treated with the same protocol, which is ACBT, which comprises three phases: breath control , chest expansion, and forced expiratory technique with coughing intervened if necessary. Every cycle takes 10 to 15 minutes, spaced out at regular intervals. From the first post-operative day until the time of discharge, there are 3 cycles per day.

This allocation aimed to ensure the effect of ACBT on pain, chest expansion, and upper extremity function in post surgical mastectomy individuals with in the hospital phase.

Our findings demonstrated reduction of pain, chest expansion, and enhanced upper limb function with a significant level of p = 0.001. In view of these results, ACBT offers a promising chest physiotherapy avenue to reduce pain and improve chest expansion and upper extremity function in the immediate phase of surgical mastectomy individuals.

In a study by mehtha JN, vaghela NP,et.conducted a study in 2017 on the title of the effect of physiotherapy in patients with radical mastectomy, 7 surgical mastectomy individuals were included in the study and they conclude that there is statistically significant improvement in chest expansion ,reduction in pain and shoulder ROM with p value of p=0.005.⁽⁵⁾

Whereas the study in this instance was limited to seven post-surgical mastectomy participants, my investigation included a larger sample.

In a study hong, Jiudi & Zhang, Siwe et. It's an randomized comparative clinical trail Conducted on 291esophagectomy individuals where in they recived either ACBT or conventional physiotherapy on post operative day,they take post pulmonary complication is their primary outcome and they revealed that the PPC rate was significantly lower in the ACBT than in conventional physiotherapy group with level of significance is p=0.001.⁽⁶⁾ group (15.2%) than in the control group.

Since the authors of the aforementioned study found that ACBT is more successful in reducing pulmonary problems in patients who had oesophagectomy surgery, I'm interested in finding out if ACBT has the similar effect in post surgical mastectomy individuals.

Limitations:

- Sample size is very small.
- Short duration study.
- There was no long term follow-up.
- There is a lack of control group.

Recommendations:

- Study can be done with large sample size.
- The future research can also be carried out with increased duration of treatment protocol.

- Further study can be done with different protocol comparison.
- Multi-center studies with larger cohorts must be conducted to validate the results of the current study.

CONCLUSION:

Here, alternative hypothesis is accepted.

The present study concluded that ACBT is an well tolerated and accepted airway clearance technique it is more effective in post surgical mastectomy individuals to reduce pain, improve chest expansion and upper extremity functional capacity.

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