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# Efficacy of post mastectomy exercises on reduction of lymphedema among patients undergone mastectomy: A pre-experimental study from central rural India

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**ABSTRACT**

Breast cancer is commonly treated with a surgical intervention called mastectomy. The feared complication of mastectomy is lymphedema. Post-mastectomy exercises are very essential for patients who have undergone mastectomy which help to prevent constriction of muscle and joint contractors and also improve lymph and bloodstream. To assess pre interventional level of lymphedema and effectiveness of exercises after mastectomy at reducing lymphedema in breast cancer patients and associated with demographic variables. The research design used in the study is one group Pre test Post test research design. Sixty post-mastectomy patients took part in the research. Quantitative variables were described as frequency and percentages. A structured demographic sheet that includes information on age, marital status, co-morbid illnesses and family history, as well as the American Lymphology Lymphedema Scale by using inch tape and a goniometer. Both descriptive and inferential statistics was used do analysis. There is a significant difference between the pre-interventional and post-interventional level of lymphedema score interpreting effective post-mastectomy exercises on reduction of lymphedema among patients undergoing mastectomy. The calculated 't' value i.e., 20.47 and the p-value was 0.001. Hence it is statistically interpreted that post-mastectomy exercise in the reduction of lymphedema among patients undergoing mastectomy was effective. An effective intervention in the prevention of lymphedema in women following mastectomy involving dissection of axillary lymph nodes could be early exercise after surgery. Breast cancer survivors can exercise safely after their mastectomy at any point during their cancer journey, including while receiving treatment.

**Keywords:** Breast cancer, mastectomy, lymphedema, goniometer.

## 1. INTRODUCTION

Globally cancer is the leading cause of morbidity and mortality. As reported by the global cancer observatory, each year there are around 800,000 cancer new cases and also 55,000 deaths (Sung et al., 2021). Breast cancer is the country's second-leading cause of death. Mastectomy is the procedure that is most frequently used to treat breast cancer surgically. After patients undergo mastectomy possible complication prone to be expected is lymphedema and which is one of the terrible complications in patients undergoing post-mastectomy (Gillespie et al., 2018a). The crucial role in preventing the complication of lymphedema is post-mastectomy exercises which help to release the muscle strain, prevent contractors and regain strength. It is very important to educate regarding exercises after mastectomy to patients undergone a mastectomy to lessen the complications (Ugur et al., 2013). Risk factors that are prone to occur after the occurrence of lymphedema are axillary lymphadenectomy, overweight, advanced age, radiation and postoperative complications (Kwan et al., 2011).

Patients with breast cancer who receive cancer treatment may experience lymphedema due to blockage or interruption of the lymphatic system (Dominick et al., 2013). Mastectomy is the procedure in which few or all the lymph nodes are evacuated. A woman after undergoing a mastectomy is at high risk of developing lymphedema (Fu, 2014). After mastectomy has been performed the lymphedema occurs just or a few days after surgical intervention. Daily living of breast cancer survivors is affected due to lymphedema evoking psychosocial problems (Gillespie et al., 2018b). Breast cancer treatment modality causes lymphedema which is the most usually heard problem in the population (Pusic et al., 2013). A huge scale of prevalence study was revealing that 28% of women undergone mastectomy and still survived had lymphedema (Sleigh and Manna, 2022). Lymphedema is incurable but could be managed when appropriately diagnosed and treated.

After mastectomy, there is 50 % probability of developing lymphedema as revealed by recent research. Post-mastectomy exercises which are frequently performed are climbing walls with your hands, turning ropes, lifting rods or broomsticks and pulling on pulleys. This exercise does not require any devices (Michelotti et al., 2019).

## 2. MATERIALS AND METHODS

### Study setting, design and data collection

The pre-experimental study was conducted at a selected hospital in Wardha city from August 11, 2021 till August 23, 2022. Post-mastectomy patients were taken as the study sample. A purposive sampling technique was used in the study. A total of sixty post-mastectomy patients were selected as a study sample. Inclusion criteria for the study are women who underwent a mastectomy and had lymphedema, women who are willing to participate and also the women who have undergone mastectomy for 1st time.

### Data collection and intervention

A structured demographic sheet revealing age, marital status, co-morbid illness and family history along with American lymphology lymphedema scale by using inch tape and goniometer. The analysis was done using descriptive and inferential statistics. Understudied and of growing importance is the integration of post-mastectomy activities into the daily lives of lymphedema sufferers. We looked at the effectiveness by including a programme of moderately intense post-mastectomy exercise. For a week for arm volume, function and strengthening the muscle in patients undergone mastectomy and had lymphedema. The post mastectomy exercises comprised of the intervention comprised of wall hand climbing exercises, rope turning exercise, rod or broomstick lifting exercise, pulley tugging exercise 2 times a day for a week. These were initially performed independently during the study period. Metacarpal phalangeal joint, Wrist, 10 cm distal to the lateral epicondyles and 15 cm proximal to the lateral epicondyles were assessed at baseline and at 7th day using classifications of lymphedema using the American lymphology association tool. After initial assessment of 1st day, the intervention was demonstrated for 1 week of period and then reassessment was done using same scale.

### Statistical analysis

Data collected were analyzed using the statistical package of social sciences using IBM SPSS statistical program version 25.0. Demographic data were collected using self-structured questionnaires and an American lymphology association scale was used to assess the effectiveness of post-mastectomy exercises. The mean and standard deviation were calculated and rated.

**Ethical consideration**

All study participants were given a brief explanation of the study's idea and goal before providing their written informed consent. The study subjects confirmed that the information acquired for the study would be kept private and confidential. The DMIMS (DU)/IEC/2021/280 reviewed and approved the study protocol.

**3. RESULTS**

**Demographic characteristics of the study variable**

The percentage-wise distribution is covered in this section of post-mastectomy women. The data that describe the sample characteristics include age, marital status and co-morbid illness (Table 1).

**Table 1** Percentage wise distribution of demographic variables of patients undergoing mastectomy

Demographic Variable	Frequency	Percentage
Age in years		
20-30	6	10%
31-40	24	40%
41-50	24	40%
Above 50	6	10%
Marital Status		
Single	0	0
Married	60	100%
Co-morbid illness		
Diabetic	14	23.34%
Hypertension	4	6.66%
None	42	70%

**Assessment of post-mastectomy exercise in reduction of lymphedema**

In the range of nil, mild, moderate and severe, assessment of post-mastectomy exercise in the reduction of lymphedema in post-mastectomy women. In pre-intervention severity of lymphedema was mild (13.3%), moderate (50%) and severe (36.7%). After the intervention severity of lymphedema were nil (40%), mild (46.7%) and moderate (13.3%) (Table 2).

**Table 2** Assessment of post mastectomy exercise in reduction of lymphedema among patients undergone mastectomy

Level of severity of lymphedema	Level of pre intervention severity of lymphedema		Level of post intervention severity of lymphedema	
	Frequency	Percentage	Frequency	Percentage
Nil	0	0	24	40.0%
Mild	8	13.3%	28	46.7%
Moderate	30	50.0%	8	13.3%
Severe	22	36.7%	0	0

**Effectiveness of post-mastectomy exercise in the reduction of lymphedema**

The mean of pre-intervention was 2.23±0.673 and post-intervention was 0.73±0.686 intervention was effective in the reduction of lymphedema (Table 3 and Figure 1).

**Table 3** Effectiveness of Post Mastectomy Exercise in Reduction of Lymphedema among Patients Undergone Mastectomy

	Mean	SD	t-value	P-value
Pre-intervention	2.23	0.673	20.475	0.001 <0.005

Post-intervention	0.73	0.686		S
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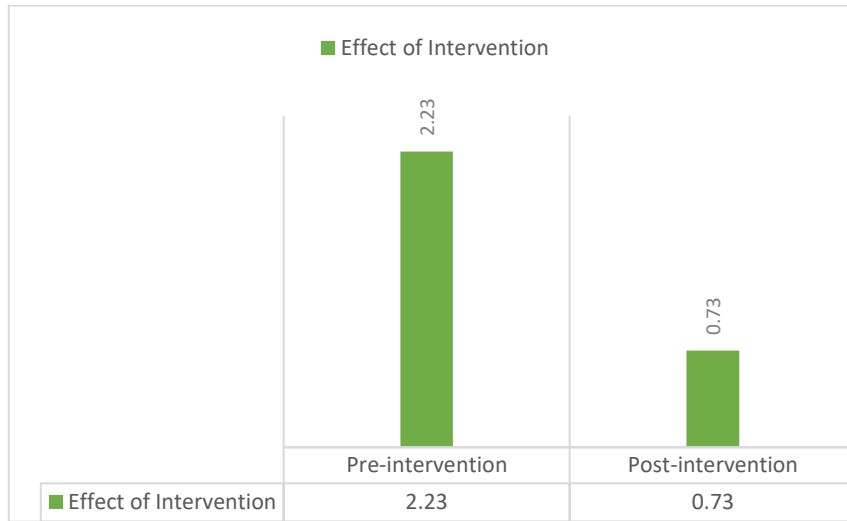


Figure 1 Shows effects of post mastectomy exercise in reduction of lymphedema

**Associate the findings with selected demographical variables**

There are significant differences in the distribution of the age in the year (p=0.043) and there was no significant in co-morbid illness (Table 4).

**Table 4** Association of demographic variables with lymphedema

Demographic variables	Frequency	Mean ± SD	F-value/ T-value	p-value
<b>Age (yrs)</b>				
20-30	6	0.00±0.00	2.904	0.043 S
31-40	24	0.83±0.702		
41-50	24	0.565±0.115		
Above 50	6	1.03±0.422		
<b>Co-morbid illness</b>				
Diabetic	14	0.57±0.756	0.723	0.490 NS
Hypertension	4	1.155±0.577		
None	42	0.76±0.617		

**4. DISCUSSION**

Lymphedema is chronic, progressive edema in the upper extremity which cause due to the destruction of the lymphatic drainage system. After mastectomy, 24% of breast cancer survivors deal with a very serious complication. An epidemiology study conducted on women undergone mastectomy-related lymphedema reveals seventy percent of patients had undergone mastectomy and out of that 70.5% of patients had lymphedema (Srivastava et al., 2012).

Our study showed that lymphedema could be occurred few days after mastectomy. The study among 30 breast cancer patients to detect the onset of lymphedema. They assessed strength and flexibility of the arm before and after mastectomy. Their results reveal that 28 post mastectomy women with 10% change in limb volume at period of three months. The research concludes that the early signs to recognize the lymphedema arise within 3 months after mastectomy. The research may facilitate early referral to lymphedema specialists and aid clinical evaluation of symptoms during the postoperative period (Torres Lacomba et al., 2010).

The study was carried out to evaluate the efficacy of a combination of physiotherapy techniques for the treatment of post-mastectomy lymphedema in 39 breast cancer patients. For six months, they combined the use of an elastic sleeve, isometric exercises and massage therapy. According to the findings, 11.13% of lymphedema decreased during the first week of treatment. Despite receiving treatment for four weeks, there was no appreciable enlargement of the lymphedema or volume. The study finds a

connection between physiotherapy methods and a decrease in lymphedema patients' arm volume; however, our study shows that post-mastectomy exercise is helpful in preventing lymphedema (Becker et al., 2006).

A prospective cohort study on the diagnosis and care of post-mastectomy lymphedema included 25 women who developed the condition after having their breasts removed. Over the course of four weeks, patients underwent multimodal therapy, which included instruction in self-management methods like massage, exercise, bandaging and sleeves. As a result of the treatment, 40% of the excess limb volume was quickly reduced and 50% after six months and by 50% at the end of the first year. According to the study, multimodal therapy decreased the volume of lymphoedematous limbs and it could be maintained by exercising and donning sleeve clothing (Armer and Stewart, 2010).

A systematic evaluation of recent literature was used to perform this study, which summarised the strength of the evidence and provided advice for breast cancer survivors regarding post-mastectomy physical exercise and lymphedema management. Twenty studies were identified which include aerobic, resistance exercises and also the other exercises modality after post-mastectomy. The study concluded that exercises are safe, but still, it requires more rigorous studies. There is strong evidence generated on the safety of exercises in the reduction of lymphedema for patients undergoing mastectomy (Yang et al., 2018).

Studies have shown that post-mastectomy exercises might enhance wellbeing and quality of life. A study conducted by the International Journal of Research in applied natural and social sciences reveals that improvement in patient's knowledge regarding post-mastectomy exercises and the use of daily practices of post-mastectomy exercises had a positive influence and an improvement in patient's prognosis. Our findings show that resistance exercise for the upper body has a positive impact on arm strength and function and a reduction in lymphedema in post-mastectomy patients (Dieli-Conwright and Orozco, 2015).

### **Limitations**

The generalizability of the data was limited because this study was a pre-experimental hospital-based investigation. Small sample size and limited area of sample selection.

## **5. CONCLUSION**

Post-mastectomy exercises could be performed frequently to reduce the risk of side effects like lymphedema. The purpose of the study was to determine whether post-mastectomy exercises could help individuals who had undergone mastectomy to reduce their lymphedema. According to the study's findings, patients who performed post-mastectomy exercises had seen a significant decrease in lymphedema. Based on the analytical report it was evident that performing post-mastectomy exercises could provoke the patients undergone surgical intervention and also help them to minimize the complications. Therefore, it is crucial for cancer survivors to exercise after a mastectomy to improve their quality of life and to meet their basic needs.

### **Acknowledgement**

We thank all the patients who participated in and contributed samples to the study.

### **Author Contributions**

AK, RA, MW and PA contributed to study design, AK, PA and MW contributed to data collection and analysis, AK and MW contributed manuscript writing. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

### **Informed consent**

Informed consent was obtained from all individual participants included in the study.

### **Ethical approval**

The study was approved by the DMIMS (DU)/IEC/2021/280 reviewed and approved the study protocol.

### **Funding**

This study has not received any external funding.

### **Conflict of interest**

The authors declare that there is no conflict of interests.

**Data and materials availability**

All data sets collected during this study are available upon reasonable request from the corresponding author.

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