

**[ORIGINAL ARTICLE]****Effectiveness of Structured Exercise Protocol in Breast Cancer Patients – Pre And Post Test Design**Ms. Sheetal Tarachand Agrawal<sup>1</sup>, Dr. Deepak Anap (PhD)<sup>2</sup>, Dr. Shwetanjali Bhagra(PT)<sup>3</sup><sup>1</sup>Under Graduate Studetns, <sup>2</sup> Professor & HOD, <sup>3</sup>Assistant Professor,  
Dept. of Musculoskeletal Physiotherapy D.V.V.P.F's College of physiotherapy, Ahmednagar.**ABSTRACT :**

**Background:** Post-operative breast cancer patients undergoing radiotherapy treatment shows complications like reduced shoulder ROM, and reduced function of upper extremity. Physiotherapy plays an important role in prevention and treatment of such complications.

**Methodology:** Interventional study was done on 20 Breast cancer women undergoing Radiotherapy treatment in Dr. Vikhe Patil Memorial Hospital, Ahmednagar. Convenient sampling method was used. The Self Confidence was assessed using Rosen Berg Self Esteem Scale, ROM (Goniometer) and pectorals tightness (Plastic transparent right angle scale).

**Result:** When shoulder Joint ROM was compared between 1st day with 3rd week for Flexion ( $p=0.002$ ), For Extension, Internal and External rotation ( $p<0.0001$ ), Abduction ( $p=0.0003$ ) showed significant improvement in extensibility. Similarly, for pectoral tightness ( $p<0.0001$ ) showed significant improvement in extensibility. For Self-Confidence ( $p<0.0001$ ) showed extreme improvement.

**Conclusion:** This study concludes that, there's an effect of structured exercise protocol in improving ROM of shoulder joint, extensibility of pectoral muscle and Self-Confidence.

**Key Words:** Breast Cancer, Self Confidence, Exercise Therapy.

**INTRODUCTION:**

Breast cancer is the most prevalent cancer in women worldwide<sup>(1)</sup>. Radiotherapy (RT) is an important modality for curative treatment in several cancers, either alone or in combination with chemotherapy, hormone therapy, immunotherapy and/or surgery<sup>(2-4)</sup>. RT after breast-conserving surgery as well as after mastectomy and axillary dissection reduces the risk of recurrence and breast cancer (BC) death<sup>(5-6)</sup>. Unfortunately, radiation in the breast area leads to physical and psychological impairments, including fatigue, pain, muscle strength loss<sup>(7)</sup>. Among the adjuvant therapies for breast cancer, radiotherapy after mastectomy can reduce the risk of a local recurrence by approximately 2/3 and remains an important component of management for breast cancer<sup>(8,9)</sup>. Although the beneficial effect of postoperative radiotherapy for breast cancer is well

documented, there are a number of complications associated with this treatment<sup>(10)</sup>.

Exercise is physical activity that is planned, structured with the goal of improving or maintaining one or more components of physical fitness<sup>(11)</sup>. As one of the non-pharmacological treatments, exercise programs have received much attention in recent years<sup>(12)</sup>. Exercise during breast cancer chemotherapy improves physical functioning<sup>(13)</sup>, treatment-related symptoms<sup>(13,15)</sup>, self-esteem<sup>(14)</sup>, and possibly even disease-specific and overall survival<sup>(15)</sup>.

The diagnosis and treatment of breast cancer comprise a critical period in a woman's life during which she suffers from concerns about the spread of cancer to other parts of the body, anxiety and depression, and altered self-confidence<sup>(15)</sup>. Self-

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confidence is an important component of mental health(16)the individual's attitude toward herself and her personal and subjective self-assessment and helps shape positive or negative ideas about her personal life<sup>(17)</sup>. Changes in physical appearance following treatment, can lead to changes in the patient's self-confidence<sup>(17)</sup>.

Recent studies have reported that exercise is feasible, safe, and well tolerated by breast cancer survivors, and has beneficial effects on QOL, fatigue, fitness, side effects of therapy, body composition, and survival<sup>(18-24)</sup>. Mock et al reported that To our knowledge, there have been few randomized controlled trials to examine the effects of supervised moderate-intensity exercise therapy during radiotherapy for breast cancer. Whereas most of the studies evaluating exercise during active treatment were carried out during chemotherapy,<sup>(24)</sup> only a few studies have been focused on the effects of exercise intervention during RT in the last decade.

#### **Material and Methodology:**

Initially Institutional Ethical Committee clearance was obtained. This was an Interventional study conducted at Dr. Vitthalrao Vikhe Patil Memorial Hospital, Ahmednagar. A total 20 Breast cancer women were recruited using convenient sampling method. The study material used was Goniometer, RSES scale and Plastic transparent right angle scale. The inclusion criteria was females with breast cancer undergoing radiotherapy treatment, Postoperative patients, age group 20-60, Willing to participate in the study. While the exclusion criteria was non cooperative patients, Patient with any psychological impairment, Patient with any other complications due to breast cancer.

#### **Procedure:**

The study is planned to find out the effectiveness of structured group exercise and home exercise protocol on Breast cancer patient undergoing radiotherapy treatment. Before starting the research work approval should be obtained from the head of institution and Institutional Ethical Committee. The entire procedure involved in the study will be explained to each participant and their consent will be taken. Initially the demographic data should be obtained and pre-assessment should be taken for pain, ROM, strength, pectoral muscle tightness. For checking pectoral tightness the subjects were requested to lie supine on a standard treatment table and adopt their

natural relaxed posture. Their arms will be placed by their sides and the elbows were flexed and rested against the lateral wall of the abdomen. The subject's hands rested gently on the abdomen which would have placed the glenohumeral joint in slight internal rotation, the linear distance will be measured from the treatment table to the posterior aspect of the acromion. The distance will be measured in centimetres using a rigid standard plastic transparent right angle with a height of 12 cm and a base of 8 cm. Without exerting any downward pressure into the table, the base of the protractor was placed on the treatment table and the vertical side was placed adjacent to the lateral aspect of the acromion. The distance of 2-4 cm will be considered normal if more than that then tightness will be present. Initially Rosenberg self esteem questionnaire will be taken to check the level of their self confidence Then a 2 week structured group exercise protocol will be given for 30 minutes, 5 times in a week which includes exercises such as wand exercise for flexion and abduction, finger ladder, Codman's exercise, strengthening with water bottle, corner's stretch, all this exercise will be repeated for 10 times. The patient's will be asked to perform these same exercises in the evening for home exercise programme and they will be provided with a pamphlet which includes all this exercises with proper labelling and diagram. Then again assessment will be taken and patient will be asked to do home exercises for 1 week, 2 times a day and reassessment will be done. The total duration of study will be 3 weeks and at the end Rosenberg self esteem questionnaire will be taken to find out the level of their self confidence after completing exercise protocol.

**Fig. 1 :** (A) and(B) Shoulder joint ROM Assessment



**A) Shoulder Abduction**



B) Shoulder flexion



Fig. 2: Pectoral Tightness Assessment

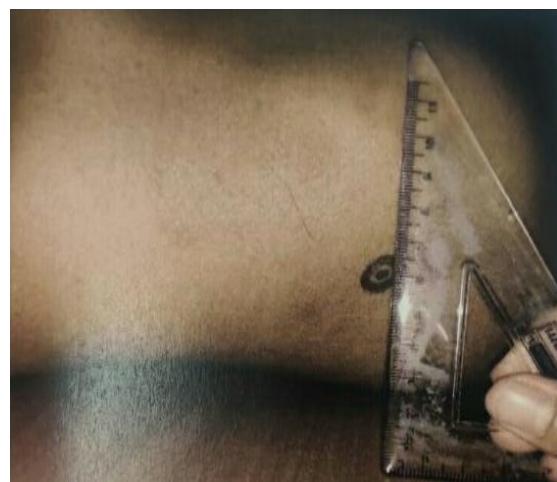


Fig. 3 : RSES Scale

**Keywords:** Breast Cancer, Self Confidence, Exercise Therapy, Radio Therapy.

**Outcomes Measures:** Self Confidence, ROM, Pectorals Tightness.

**Statistical Analysis:** It will be analyzed using paired t test.

**Result:** The data was collected from breast cancer women undergoing radiotherapy treatment using repeated measures ANOVA test and represented in the tables shown below.

Table No. 1 : Comparison of Shoulder Flexion ROM

Flexion	MEAN ± SD	P value	RESULT
1 <sup>st</sup> day	175.75 ±5.2	0.0002	Extremely Significant
1 <sup>st</sup> week	177.25± 3.4		
2 <sup>nd</sup> week	177.6± 2.9		
3 <sup>rd</sup> week	177.8 ±2.8		

Table No. 2 : Comparison of Shoulder Extension

Extention	MEAN ± SD	P value	RESULT
1 <sup>st</sup> day	50.65±8.19	< 0.0001	Extremely Significant
1 <sup>st</sup> week	53.6±5.57		
2 <sup>nd</sup> week	55.9±3.85		
3 <sup>rd</sup> week	56.7±3.01		

Table No. 3: Comparison of Shoulder Abduction

Abduction	MEAN ± SD	P value	RESULT
1 <sup>st</sup> day	174.45±6.93	0.0003	Extremely Significant
1 <sup>st</sup> week	176±4.69		
2 <sup>nd</sup> week	176.35±4.41		
3 <sup>rd</sup> week	176.75±4.01		

Table No.4: Comparison of Shoulder Internal Rotation

Internal Rotation	MEAN ± SD	P value	RESULT
1 <sup>st</sup> day	61.2±9.50	< 0.0001	Extremely Significant
1 <sup>st</sup> week	63.45±8.68		
2 <sup>nd</sup> week	65.75±6.81		
3 <sup>rd</sup> week	67.9±5.48		

Table No. 5 : Comparison of Shoulder Ext. Rotation

External Rotation	MEAN ±SD	P value	RESULT
1 <sup>st</sup> day	70.8±9.919	< 0.0001	Extremely Significant
1 <sup>st</sup> week	72.8±8.495		
2 <sup>nd</sup> week	74.55±7.000		
3 <sup>rd</sup> week	76.05±6.211		

**Table No. 6: Comparison of Pectoral Tightness (R)**

Pectoral tightness (Rt)	MEAN ± SD	P value	RESULT
1 <sup>st</sup> day	1.85±0.51	< 0.0001	<b>Extremely Significant</b>
1 <sup>st</sup> week	1.65±0.56		
2 <sup>nd</sup> week	1.525±0.44		
3 <sup>rd</sup> week	1.445±0.42		

**Table No. 7 : Comparison of Pectoral Tightness(L)**

Pectoral tightness (Lt)	MEAN ± SD	P value	RESULT
1 <sup>st</sup> day	2.13±0.5391	< 0.0001	<b>Extremely Significant</b>
1 <sup>st</sup> week	1.945±0.4501		
2 <sup>nd</sup> week	1.775±0.3796		
3 <sup>rd</sup> week	1.74±0.3899		

**Table No. 8 : Comparison of Self Confidence**

Self Confidence	MEAN ± SD	P value	RESULT
1 <sup>st</sup> day	26.2±2.16	< 0.0001	<b>Extremely Significant</b>
1 <sup>st</sup> week	28.5±2.43		
2 <sup>nd</sup> week	30.85±2.08		
3 <sup>rd</sup> week	34.25±2.29		

The following tables shows comparison of p value which was calculated using Tukey-Kramer Multiple Comparisons Test for ROM of shoulder Joint , pectoral tightness and self confidence of 1st day with each 1<sup>st</sup> week, 2<sup>nd</sup> week and 3<sup>rd</sup> week similarly of 1st week, 2<sup>nd</sup> and 3<sup>rd</sup> week with others.

**Table No. 1 A : Comparison of Flexion ROM**

Flexion	P value	Result
1 <sup>st</sup> day vs 1 <sup>st</sup> week	<0.05	Significant
1 <sup>st</sup> day vs 2 <sup>nd</sup> week	<0.01	Significant
1 <sup>st</sup> day vs 3 <sup>rd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> week vs 2 <sup>nd</sup> week	>0.05	Not Significant
1 <sup>st</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant
2 <sup>nd</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant

**Table No. 1 B : Comparison of Ext. ROM**

Extension	P value	Result
1 <sup>st</sup> day vs 1 <sup>st</sup> week	<0.05	Significant
1 <sup>st</sup> day vs 2 <sup>nd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> day vs 3 <sup>rd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> week vs 2 <sup>nd</sup> week	>0.05	Not Significant
1 <sup>st</sup> week vs 3 <sup>rd</sup> week	<0.01	Significant
2 <sup>nd</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant

**Table No. 1 C : Comparison of abduction ROM**

Abduction	P value	Result
1 <sup>st</sup> day vs 1 <sup>st</sup> week	<0.05	Significant
1 <sup>st</sup> day vs 2 <sup>nd</sup> week	<0.01	Significant
1 <sup>st</sup> day vs 3 <sup>rd</sup> week	<0.001	Significant
1 <sup>st</sup> week vs 2 <sup>nd</sup> week	>0.05	Not Significant
1 <sup>st</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant
2 <sup>nd</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant

**Table No. 1 D : Comparison of Internal Rotation**

Internal rotation	P value	Result
1 <sup>st</sup> day vs 1 <sup>st</sup> week	>0.05	Not Significant
1 <sup>st</sup> day vs 2 <sup>nd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> day vs 3 <sup>rd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> week vs 2 <sup>nd</sup> week	>0.05	Not Significant
1 <sup>st</sup> week vs 3 <sup>rd</sup> week	<0.001	Extremely Significant
2 <sup>nd</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant

**Table No. 1 E : Comparison of Ext ROM**

External Rotation	P value	Result
1 <sup>st</sup> day vs 1 <sup>st</sup> week	>0.05	Not Significant
1 <sup>st</sup> day vs 2 <sup>nd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> day vs 3 <sup>rd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> week vs 2 <sup>nd</sup> week	>0.05	Not Significant
1 <sup>st</sup> week vs 3 <sup>rd</sup> week	<0.01	Significant
2 <sup>nd</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant

**Table No. 2 A : Comparison of Pectoral Tightness**

Pectoral Tightness (Rt)	P value	Result
1 <sup>st</sup> day vs 1 <sup>st</sup> week	>0.05	Not Significant
1 <sup>st</sup> day vs 2 <sup>nd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> day vs 3 <sup>rd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> week vs 2 <sup>nd</sup> week	>0.05	Not Significant
1 <sup>st</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant
2 <sup>nd</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant

**Table No. 2 B : Comparison of Pectoral Tightness**

Pectoral Tightness(Lt)	P value	Result
1 <sup>st</sup> day vs 1 <sup>st</sup> week	>0.05	Not Significant
1 <sup>st</sup> day vs 2 <sup>nd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> day vs 3 <sup>rd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> week vs 2 <sup>nd</sup> week	>0.05	Not Significant
1 <sup>st</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant
2 <sup>nd</sup> week vs 3 <sup>rd</sup> week	>0.05	Not Significant

**Table No. 3 A : Comparison of Self Confidence**

Self Confidence	P value	Result
1 <sup>st</sup> day vs 1 <sup>st</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> day vs 2 <sup>nd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> day vs 3 <sup>rd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> week vs 2 <sup>nd</sup> week	<0.001	Extremely Significant
1 <sup>st</sup> week vs 3 <sup>rd</sup> week	<0.001	Extremely Significant
2 <sup>nd</sup> week vs 3 <sup>rd</sup> week	<0.001	Extremely Significant

**Discussion:**

This study aims to provide an up-to-date review of the effect of an exercise intervention in cancer patients during Radiotherapy. In the last few years, progress has been achieved in Radiotherapy treatment and it has provided many benefits to patients. Unfortunately, however, Radiotherapy still results in a range of acute and late toxicities.

The present 3 weeks interventional study was conducted on (N=20) postoperative breast cancer women undergoing Radiotherapy treatment to check

the effect of structured exercise protocol on ROM of Shoulder joint, pectoral tightness and self - confidence. The participants obtained good mean score for all outcome measures. When shoulder Joint flexion ROM was compared between 1st day with 3rd week ( $p= 0.002$ ) which showed significant increase in extensibility. For extension, Internal and External rotation when compared between 1st day with 3rd week ( $p<0.0001$ ) showed extreme improvement in extensibility. For abduction ( $p=0.0003$ ) which showed significant improvement in extensibility.

In this study it was found that the ROM of shoulder joint in all directions showed extremely significant improvement in extensibility of muscles when compared between 1st day with 3rd week. Our results are similar to Ji Hye Hwang et.al who reported that after radiotherapy, the exercise group showed increased ROM of shoulder joint in all directions and decreased pain score. Most patients complained of mild to moderate pain at the shoulder girdle and/or at incision area. Pain and muscle spasms can occur in the shoulder region as a result of muscle guarding<sup>(25)</sup>. In addition, chest wall adhesion can lead to increased risk of pain and reduction in ROM of the shoulder on the involved side as well as postural dysfunction.

The values for pectoral tightness of right side and left side when compared on 1st day with 3rd week ( $p<0.0001$ ) which showed significant improvement in extensibility.

So Young Lee et.al reported that a 4 week stretching program was effective for improving Pectoral Muscle Tightness in breast cancer patients. Therefore, the effect of stretching on breast cancer patient requires further study with a larger sample and with different methods and treatment durations. His study is the first to evaluate an effective method for stretching of pectoral muscle tightness in breast cancer patients. Despite a high prevalence of pectoral muscle tightness in breast cancer patients, problems related to pectoral tightness have been overlooked. Clinicians and Therapist should be more concerned about pectoral muscle tightness in breast cancer patients and investigators should make an effort to evaluate effective stretching methods for pectoral muscle tightness<sup>(26)</sup>.

When the values for self confidence were compared of 1st day with 3rd week ( $p<0.0001$ ) which showed extreme improvement in self confidence.

The present participants obtained a good mean score of self-confidence. A study conducted by Marila et al., (2015) in Brazil to assess self-confidence in cancer patients undergoing treatment showed that the majority of the patients had high or good self-confidence. Similarly, Sadegi and khoda bakhshi,(2012) also compared body image and self-confidence in two groups of women with breast cancer and reported high scores of self-confidence in them. The results showed no significant differences in self-confidence between the patients and the general public; in fact, the patients' self-confidence may even be higher because they have learnt to adapt to their disease and live with cancer (Carpenter, 1998). A study conducted by Noghani et al., (2006) to examine self-confidence in 101 male and female patients with cancer hospitalized at the oncology wards of hospitals affiliated to Tehran University of Medical Sciences showed that the majority of the patients had moderate confidence in their ability to adapt to different life conditions due to the mental and physical disabilities or limitations they experienced, and a statistically significant relationship was thus observed between the patients' self-esteem and changes or reduction in their physical functioning<sup>(17)</sup>.

Segal et al. reported greater improvement in physical functioning of participants in the self-directed exercise group than the supervised exercise group. However, the duration of exercise was so long (26 weeks) that there was a lower dropout rate in the more convenient self-directed home-based exercise group than the supervised class, which was attributed to significant differences in increased physical functioning<sup>(28)</sup>. Pickett et al. reported that 22% of patients did not exercise, and 13% of patients dropped out when moderate-intensity walking exercise was performed for 6 month<sup>(27)</sup>. In contrast, Windsor et al. reported that adherence increased when the same moderate-intensity exercise was performed for 4 weeks<sup>(28)</sup>. Indeed, Mutrie et al. reported that the supervised exercise group showed improvement in physical and psychological functioning in comparison with the home-based exercise group, which was similar to our results. Therefore, supervised exercise guided by professional therapists might be more effective than home-based exercise, if it is possible to achieve high adherence. In this study, the exercise program was initiated on the same day that patients received radiotherapy; therefore there was no drop out in the

exercise group.

#### **Conclusion:**

The present study concludes that there is a effect of structured exercise protocol in improving ROM of shoulder joint, self-confidence and improving extensibility of pectoral muscle.

#### **Limitation:**

- 1) Small sample size.
- 2) Less no. of long-term follow-up cases.
- 3) There is no control group.

**Future Scope:** Further Randomised Control Trial including large sample size and long term follow up can be conducted.

**Source of Funding:** None

**Conflict of Interest:** There is no conflict of interest.

**Ethical Clearance:** Institutional Ethical Committee of COPT which is registered and affiliated by Government of India.

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