

“EFFECT OF PROGRESSIVE RESISTIVE TRAINING ON THE MOVEMENT AND FUNCTIONAL CAPACITY IN BREAST CANCER PATIENTS.” A QUASI STUDY.

Hafiz Muhammad Uzair Asghar

King Edward Medical University Lahore
Department: Department of Physiotherapy Mayo Hospital LHR
University or Organization: King Edward Medical University Lahore.

Supervisor’s Details: Dr. Junaid Ijaz Gondal

(M.phil. Phd Scholar Mayo Hospital)
City: Lahore
State/Province: Punjab
Country: Pakistan
Email:uzairasgharkemu@gmail.com
Contact No:0332-1666957

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ABSTRACT:

Introduction:

Breast cancer relates to the rampant growth of the cells in the breast and it entails strong and length treatment. The prominent features of breast carcinoma includes bump in the breast region, dimpling on the skin, alternation in the appearance of the breast, oozing fluid out of the nipple. A recently modified areola. red textured way of the skin. BC is among the second leading reason of deaths due to cancer in women and the treatment worth millions. Different studies work on the function and functional capacities in breast cancer patients. There is absence of proof to draw conclusions about the usefulness of progressive resistive training when compared with conventional therapy on movement and functional capacity. The purpose is to find out whether these two techniques yield comparable outcomes and if technique is superior which should be alternative of therapy.

Objectives:

To find the effects of progressive resistive exercises on pectoralis and shoulder muscles on breast carcinoma patients.

Methodology:

Total 40 patients (female) were included in the study. Two groups were made. Each group consisted of 20 patients. Both groups received the respective therapy along with the baseline treatment. Three sessions per week given for 6 weeks. Pre and post treatment assessment, SPADI, MMT and ROM of shoulder muscles were done.

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Results:

Data was analyzed by SPSS 23. Two types of statistical test were used i.e independent and paired t-test initially evaluate the difference within and between the two groups. No significant measures were found in any of the outcome measures between progressive resistive training and conventional therapy ($p < 0.05$).

Conclusion:

Progressive resistive exercise is more effective than conventional therapy on the muscles pectoralis and shoulder of breast cancer survivors

Key words: Progressive resistive exercises, breast cancer, shoulder carcinoma.

INTRODUCTION:

Breast cancer (BC) relates to the rampant growth of the cells in the breast and it entails strong and lengthy treatment (1). Overcomers of breast malignant growth address the biggest gathering of female disease survivors (2) Breast cancer BC is among the second-leading reason of deaths due to cancer in women and the treatment worth millions (3) The most important assembly present in the pectoral region is mammary gland, which is an improved gland intensely related to pectoralis major (4) Uncontrolled growth of the cells in the breast tissue results in breast cancer (5)

BC is widely diagnosed among women. It is estimated that 1 out of 8 women in the U.S. are suffering from breast cancer, and in the case of Pakistan, it is among 1 out of 9 females. (6) Way of life changes are frequently connected with helpless dietary decisions and absence of actual work; both considered significant danger factors for the advancement of the sickness (7) . The most common types of BC are: Invasive ductal carcinoma and Invasive lobular carcinoma. (8) . A significant number of the set up hazard factors are connected to estrogens, early menarche, late menopause, and heftiness in postmenopausal ladies, and high groupings of endogenous estradiol (9).

Physiotherapy plays a vital role in the field of breast cancer. Exercise is an operative involvement to improvise excellence of life, cardiorespiratory, physical capabilities and to reduce exhaustion in BC patients and fighters (10) The impacts of activity preparing in breast malignancy patients started to be inspected in the last part of the 1980's. The principal study inspecting the impacts of activity in breast malignancy patients was distributed in 1989 (11) Additionally, there is proof to propose an expected defensive impact of PRT as found in the Physical Activity and Lymphedema preliminary ($n = 154$), which found that PRT decreased self-revealed indications of growing in correlation with common consideration (11% versus 17%; $P = .03$) among in danger ladies (>5 lymph hubs eliminated). (12) In an investigation of 301 patients going through chemotherapy, it was observed that higher-power training was more fruitful in lessening pain, contrasted with lower-force power training and joined training. In any case, pain appraisal in the past examination was practiced by utilizing a personal satisfaction poll as opposed to utilizing a particular scale (13)

One study exhibited that the patients endured practice preparing and huge improvement in cardiorespiratory useful limit [represented by the variable VO₂max (L/min)] was seen in the activity preparing gathering. From that point forward, an always developing number of studies looking at the impacts of activity in breast disease patients has kept on being quite possibly the most contemplated population in this generally new and energizing region of activity oncology research. (14) However, very few researches have been done on this field previously and my research adds in the existing boundary of knowledge and lies within the domain of the effect of progressive resistive training on movement and functional capacity in breast cancer patients. It deals with the study of major muscles that affected by mastectomy (surgical removal of one or both breasts). The affected muscles are Pectoralis major and Pectoralis minor. Moreover, in addition to this, the shoulder muscles are also affected by mastectomy. These shoulder muscles are divided includes shoulder flexors, external rotators and abductors. The outcomes of this study could potentially guide clinical decision making concerning the most effective intervention to improve the health status, quality of life, and strengthen the muscles in those cancer people. (15)

MATERIALS AND METHODS:

SUBJECTS:

Morals and Ethical approval was taken by the Institutional Review Board. Educated composed assent was taken from the patients and family members. The examination was led in Department of Physiotherapy, Mayo Hospital Lahore. The span of study was a six months after the endorsement of summation. The inclusion criteria were (1) unilateral mastectomy (2) adjunctive radiotherapy (3) shoulder pain (4) age (above 30 years) and (5) decreased ROM. Exclusion criteria were: (1) bilateral mastectomy (2) adjunctive chemotherapy (3) shoulder impingement pain (4) adhesive capsulitis and (5) age (below 30 years).

There are 40 patients who were arbitrarily separated into the two gatherings (for example control and study group) utilizing fixed envelopes. The patients numbers were created by arbitrary number tables.

Initial session involved the performance of subjective and objective examination. The subjects added in Group A received Progressive Resistive Exercise. According to De Lorme Program, which is mentioned in the form of chart below, subjects were receiving Progressive Resistive Exercise 3 sets with each of 10 repetitions maximum. This exercise session was carried out as 3 session per week for total of 6 weeks. Patients were guided for the exercises they had to carry out at home.

	Set(s) of 10	Amount of Weight	Repetitions
DeLorme Program	1	50% of 10 RM	10
	2	75% of 10 RM	10
	3	100% of 10 RM	10

The subjects who were randomly assigned **Group B** received conventional therapy. I performed Range of Motion (ROM) and isometrics on subjects by 3 sets with each of 10 repetitions maximum. This will also be carried out for 6weeks with 3 sessions per week. The exercise regimen which was followed by both groups include:

- Progressive Resistive Exercise for shoulder flexion, shoulder abduction and shoulder external rotation and pectoralis major and pectoralis minor.
- ROM for shoulder flexion, shoulder abduction, and shoulder external rotation and pectoralis major and pectoralis minor.

- Isometrics for shoulder flexors, shoulder abduction, and shoulder external rotation and pectoralis major and pectoralis minor.

All the exercises were guided in sitting position to avoid any discomfort in the completion of the plan. All the subjects scheduled 3 days in a week after the initial examination and intervention session. The treatment was given in 6 weeks, three sessions per week. Assessment of patients was done at 0th day, and after 6 weeks. Along with the goniometer evaluation of shoulder and pectoralis ROM was done at every assessment. This data was used as the outcome measures.

The outcome measures are pain, strength and range of motion. Pain was measured by SPADI on day 0 and week 6 pre and post treatment respectively. Similarly, the strength of pectoralis and shoulder muscles is evaluated by the use of manual muscle testing on day 0 and week 6. Goniometer was used to measure the range of motion at 0 and 6 days for pre and post treatment values.

The Shoulder Pain and Disability Index (SPADI) scale is used to calculate the pain and dysfunction in shoulder joint. The SPADI consists of 13 things that assess two spaces; one of them is 5-thing subscale that evaluates pain and the other is 8-thing subscale that assesses disability. (16) Manual Muscle Testing (MMT) to measure the strength of rotator cuff muscles. MMT is considered to be very easy to apply on patients but needs skillful hand application. MMT consists of a 6-point scale from 0-5 (17). Goniometry is used to measure and document the amount of active and passive joint movement. It is measured by a specialized instrument called goniometer. (18)

DATA ANALYSIS

Data was analyzed by SPSS (23). The quantitative factors introduced in type of mean and standard deviation. The subjective variable introduced in type of rates and frequencies. Normality data is evaluated by Shapiro Wilk test. A paired and independent t test were used to determine the difference within and between two groups.

RESULTS:

Patients' progression in the study is shown by figure 1. Table 2 shows the Shapiro Wilk test of normality, in which $P > 0.05$ is for all variables. A paired sample T-test was used to determine the pre and post treatment values within the same group and independent sample T-test was used to evaluate between the two groups

Comparison of SPADI score in group 1 has shown that there was remarkable change in the before and after treatment SPADI score, pretreatment score was 72.10 ± 7.85 and post treatment was 35.15 ± 4.85 , with the P value of 0.00.

Comparison of manual muscle testing score in group 1 has shown that there was significant differentiation of pre and post treatment MMT score, pretreatment mean shoulder flexor MMT score was 2.80 ± 0.61 and post treatment was 3.70 ± 0.65 , pretreatment mean shoulder external rotators MMT score was 2.35 ± 0.48 and post treatment was 3.75 ± 0.71 and pretreatment mean shoulder abductors MMT score was 2.20 ± 0.41 and post treatment was 3.75 ± 0.85 with the P value of 0.00.

By the correlation of post treatment SPADI score in group 1 and 2 showed that there was critical contrast in SPADI score for these groups. Post treatment SPADI score in group 1 was 35.1500 ± 4.8588 and post treatment SPADI score in group 2 was 40.7500 ± 3.9185 . with the P value of 0.00, showing that progressive resistive training (PRE) was significant in improving the functional ability in muscles of shoulder in patients of Breast cancer.

Comparison of post treatment MMT score in group 1,2 showed that there was remarkable change in group 1,2. Post treatment MMT of shoulder flexion in group 1 was 3.7000 ± 0.65695 , and group 2 was 2.9500 ± 0.60481 , post treatment MMT of shoulder external rotation was 3.7500 ± 0.71635 and group 2 was 3.2500 ± 0.63867 , post treatment MMT of shoulder abduction was 3.7500 ± 0.85070 and group 2 was 3.3000 ± 0.47016 . with the P value of 0.00, showing that progressive resistive training (PRE) was significant in improving the strength of shoulder muscles in patients of Breast Cancer.

Comparison of post treatment ROM of shoulder of group 1,2 showed that there was distinct difference in post treatment score in group 1,2. The mean of Shoulder flexion ROM in group 1 was 136.0500 ± 14.20702 , in group 2 was 117.3500 ± 11.41686 , shoulder external rotation ROM in group 1 was 46.2500 ± 5.34962 , in group 2 was 32.6000 ± 4.58143 and mean score of shoulder abduction ROM in group 1 was 122.6000 ± 14.51823 and in group 2 was 100.2500 ± 15.5998 .

DISCUSSION:

The aim of the research was to discriminate the effect of progressive resistive training and conventional therapy on the pectoralis and shoulder muscles of breast cancer patients. The results showed that progressive resistive training (PRE) was significant in improving strength on the pectoralis and shoulder muscles in patients of breast cancer. Both had influence in reducing pain, improving functional ability and ranges of motion but Progressive Resistive Training (PRE) was more effective than other treatment protocols.

Disease represents in excess of 8 million passings around the world. It is assessed that the quantity of new cases will increment by 70% throughout the following twenty years, making disease one of the chief reasons for dreariness and mortality (17). Indeed,

research somewhat recently gives proof that reformist obstruction preparing (PRT) is protected as far as lymphedema beginning and compounding(19-21)

On the off chance that PRT can forestall arm lymphedema, we may have neglected to show it as a result of an absence of information on the pathophysiology. At long last, almost 40% of the benchmark group announced investment in normal exercise containing strength preparing during the intercession. Nonetheless, vulnerability exists about the degree of this potential inclination in light of the fact that neither customary exercise nor strength preparing was all around characterized. In any case, the potential effect is probably going to have weakened contrasts between the mediation and control gatherings.(18)

Another study conducted by Lauridsen MC, Christiansen P revealed that physical therapy enhances the shoulder function of the patients who go through surgical treatment for BC.

The type of surgery that is performed and the application of radiation therapy among patients who have undergone mastectomy influences the effect of treatment. (22) However, there are mixed views of the authors in the literature whether to start training exercise right after the surgery or after a few days, both with the prescription of a physiotherapist. It has also been viewed that Radiotherapy is the major cause of the shoulder immobility and decreased strength. And physiotherapy for longer period, would be more beneficial to the patients have gone through Radiotherapy (23)

There is no arrangement in the writing concerning the ideal organization of pain in patients with breast illness; clinical assessments that assess the pain therefore in these patients are meager. (3)

As well as lessening pain, the activities in this examination likewise expanded VO2 max, adaptability, and strength. This shows that actual preparing can be a viable non-pharmacological mediation during and after therapy for cancer malignancy (6)

The combination of both exercises had influence in reducing pain and improving the functional ability of shoulder muscles in management of breast cancer patients.

Resistance exercises play a vital role for the better synchronization of motor unit recruitment, effective central nervous system activity, and the excitability of motor-neuron , in addition to lessening the inhibitory neural reflexes and resistance and flexibility training (24) but the results of my study showed that progressive resistive training had a great impact in reducing pain , improving functional ability and shoulder muscles Ranges of motion in breast cancer patients.

Interventions included aerobic exercise (19); resistance exercise (11); a combination of both (21); an arm with aerobic exercise and another of resistance training (6); or a multicomponent

program combining aerobic exercise, strength training, and flexibility (3);

and additionally, one intervention of resistance exercise and impact training, one of resistance

and flexibility and a placebo exercise intervention (only flexibility exercise).(25)

CONCLUSION: Progressive resistive exercise is more effective than conventional therapy on the muscles (pectoralis and shoulder) of breast cancer survivors.

Ethics approval and consent to participate:

Participants were informed about the objectives of the study was observed by all individuals and consent form in the written form was obtained. The study received approval from the Committee of INSTITUTIONAL REVIEW BOARD (IBR), Research Center King Edward Medical University Lahore.

Consent for publication

Individuals were informed about the aims of the study and written informed consent was obtained.

Competing interests

There is no competing interest as declared by the author. The results of the study are presented clearly, honestly, and without fabrication, falsification, or misleading data manipulation.

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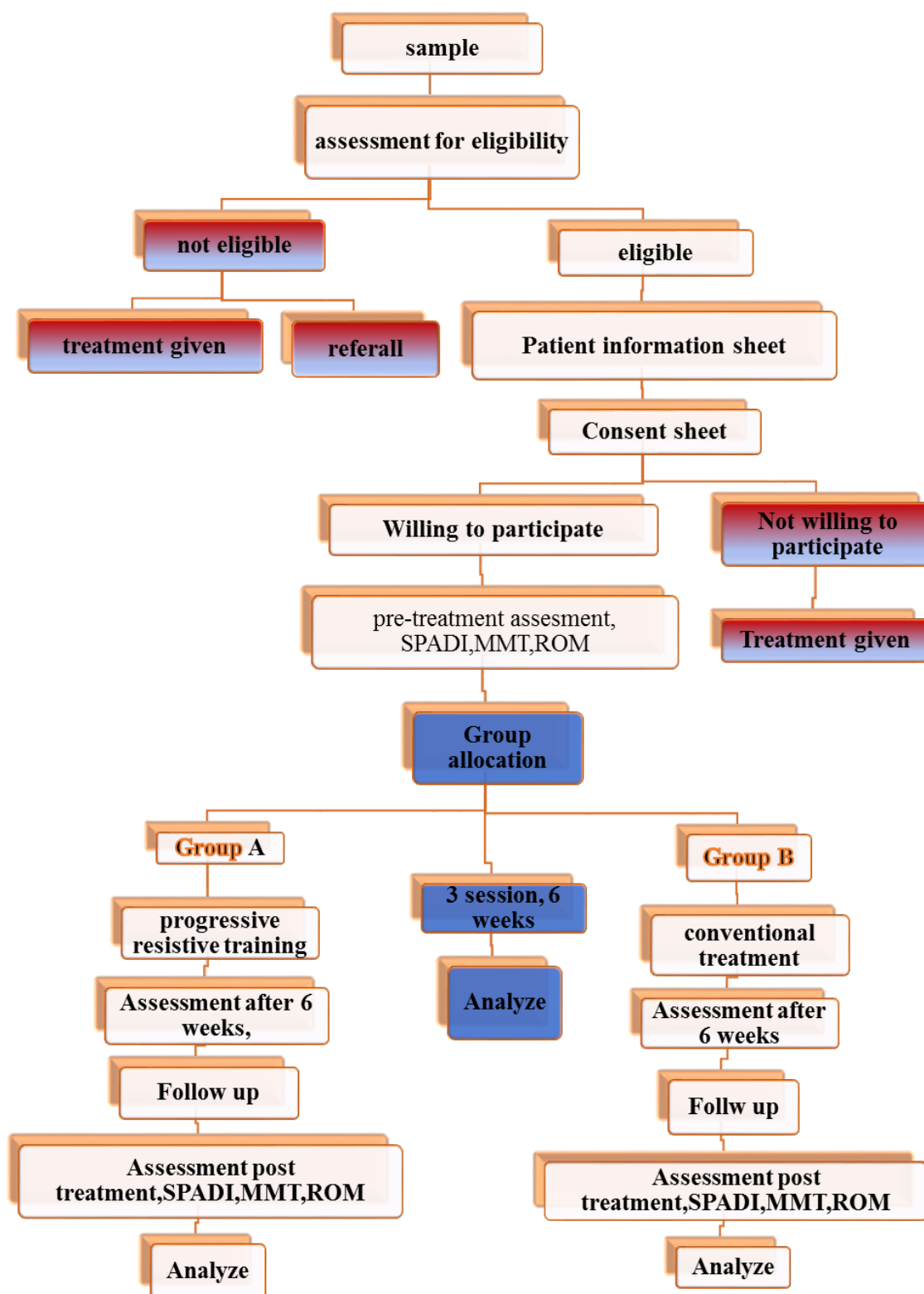


Figure1

RESULTS:

Table 1: Age distribution in group 1

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age in Group 1	20	35.00	63.00	48.9500	8.56845
Age in Group 2	20	34.00	61.00	45.3500	8.60401

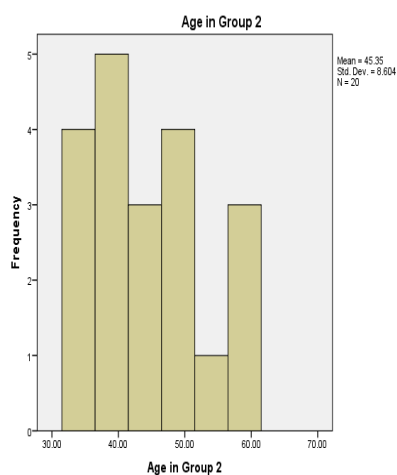
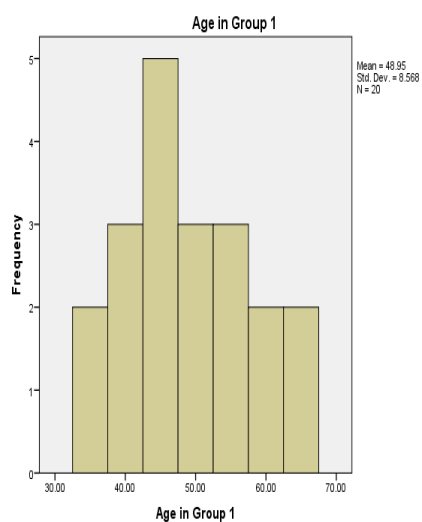


Table 2: Test of Normality

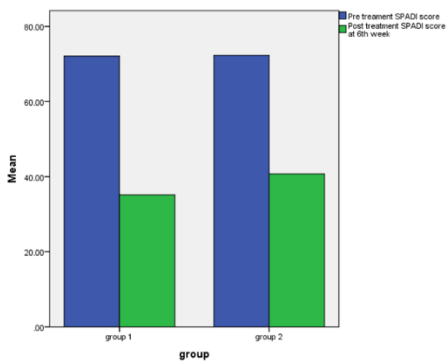
	Shapiro- Wilk		
	Statistic.	df	Sig.
Pre treatment SPADI score in group 1	.936	20	.200
Post treatment SPADI score at 6th week in group 1	.960	20	.548
Pre Treatment MMT of shoulder flexion in group 1	.771	20	.080
Post Treatment MMT of shoulder flexion at 6th week in group 1	.780	20	.060
Pre Treatment MMT of shoulder external rotation in group 1	.608	20	.058

Post Treatment MMT of shoulder external rotation at 6th week in group 1	.795	20	.071
Pre Treatment MMT of shoulder abduction in group 1	.495	20	.040
Post Treatment MMT of shoulder abduction at 6th week in group 1	.874	20	.064
Pre Treatment ROM of shoulder flexion in group 1	.873	20	.083
Post Treatment ROM of shoulder flexion at 6th week in group 1	.932	20	.167
Pre Treatment ROM of shoulder external rotation in group 1	.951	20	.383
Post Treatment ROM of shoulder external rotation at 6th week in group 1	.920	20	.098
Pre Treatment ROM of shoulder abduction in group 1	.918	20	.092
Post Treatment ROM of shoulder abduction at 6th week in group 1	.944	20	.288
Pre treatment SPADI score in group 2	.925	20	.126
Post treatment SPADI score at 6th week in group 2	.858	20	.007
Pre Treatment MMT of shoulder flexion in group 2	.736	20	.000
Post Treatment MMT of shoulder flexion at 6th week in group 2	.768	20	.060
Pre Treatment MMT of shoulder external rotation in group 2	.768	20	.090
Post Treatment MMT of shoulder external rotation at 6th week in group 2	.780	20	.780
Pre Treatment MMT of shoulder abduction in group 2	.768	20	.760
Post Treatment MMT of shoulder abduction at 6th week in group 2	.580	20	.058
Pre Treatment ROM of shoulder flexion in group 2	.877	20	.066

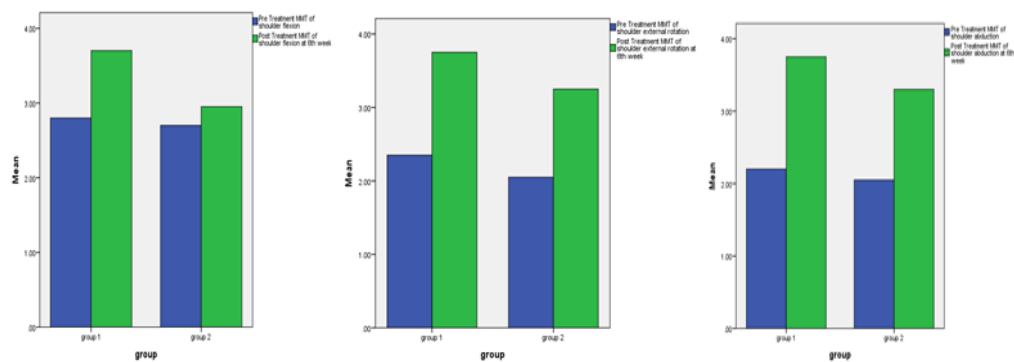
Post Treatment ROM of shoulder flexion at 6th week in group 2	.924	20	.121	Test of
Pre Treatment ROM of shoulder external rotation in group 2	.881	20	.058	
Post Treatment ROM of shoulder external rotation at 6th week in group 2	.900	20	.042	
Pre Treatment ROM of shoulder abduction in group 2	.903	20	.046	
Post Treatment ROM of shoulder abduction at 6th week in group 2	.918	20	.090	

Normality

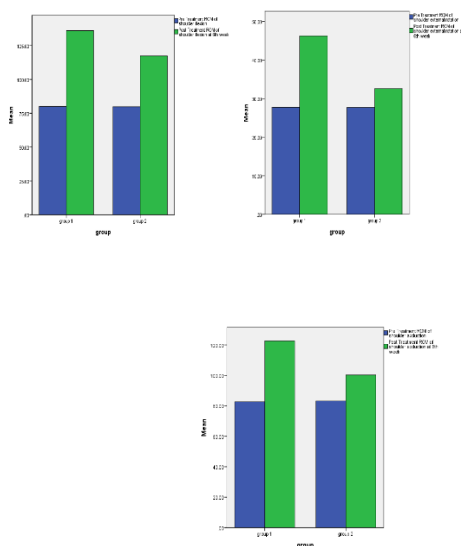
According to the Shapiro Wilk test of normality, data was normally distributed as $P > 0.05$ for almost all variables.



Bar chart 1: comparison distribution between the post treatment SPADI score in group 1,2



Bar chart 2: Post treatment MMT of shoulder flexion, external rotation and abduction of Group 1,2



Bar chart 3: Comparison distribution post treatment score of shoulder ROM in flexion, external rotation and abduction in group 1,2

Pre and post Treatment values of Group 1 and 2 (TABLE 1)

Outcomes	GROUP 1 (n=20)			GROUP 2 (n=20)		
	Pre-value	Post-value	p value	Pre-value	Post-value	p value
SPADI SCORE	72.10 ±7.85	45.150 ±4.858	0.000*	72.30± 8.013	40.75± 3.918	0.000*
MMT						
MMT (FLEXION)	2.800± 0.615	3.700± 0.656	0.000*	2.700± 0.571	2.950± 0.604	0.000*
MMT (ER)	2.350 ±0.489	3.750± 0.716	0.000*	2.050± 0.604	3.250± 0.633	0.000*
MMT (ABD)	2.200 ± 0.410	3.750 ± 0.850	0.000*	2.050 ±0.604	3.300 ±0.470	0.000*
ROM						
ROM (FLEXION)	80.00 ±14.418	136.05 ±14.207	0.000*	79.85 ±15.197	117.35± 11.41	0.000*
ROM (ER)	27.75± 6.463	46.25 ±5.349	0.000*	27.70 ±5.554	32.60 ± 4.581	0.000*
ROM (ABD)	82.70± 18.154	122.60± 14.518	0.000*	83.20 ±16.55	100.25 ±15.59	0.000*

Shoulder Pain and Disability Index (SPADI) and Manual Muscle testing (MMT) Range of motion (ROM); Values expressed: average ± standard deviation; ER (external rotation); ABD (abduction); *p value < 0.05

Post Treatment Values of Group 1 and 2 (TABLE 2)

VARIABLE	GROUP 1		GROUP 2	
	POST-VALUE	P-VALUE	POST-VALUE	P-VALUE
SPADI SCORE	45.150 ±4.858	0.000*	40.75 ±3.918	0.000*
MMT				
MMT (FLEXION)	3.700± 0.656	0.000*	2.950 ±0.604	0.000*
MMT (ER)	3.750± 0.716	0.000*	3.250± 0.633	0.000*
MMT (ABD)	3.750 ± 0.850	0.000*	3.300 ±0.470	0.000*
ROM				
ROM (FLEXION)	136.05± 14.207	0.000*	117.35± 11.41	0.000*
ROM (ER)	46.25 ± 5.349	0.000*	32.60 ± 4.581	0.000*
ROM (ABD)	122.60 ±14.518	0.000*	100.25± 15.59	0.000*

Shoulder Pain and Disability Index (SPADI) and Manual Muscle testing (MMT) Range of motion (ROM); Values expressed: average± standard deviation; ER (external rotation); ABD (abduction); *p<0.05

