



A STUDY TO EVALUATE THE EFFECTS OF THORACIC EXPANSION EXERCISES, SHOULDER ROM AND POSTURAL EXERCISES ON THORACIC EXPANSION, SHOULDER ROM AND POSTURE IN UNILATERAL MASTECTOMY INDIVIDUALS

Physiotherapy

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ABSTRACT

A mastectomy is surgery to remove all or a part of breast tissue from a breast. It's most often done to treat or prevent breast cancer. The study was conducted on 30 subjects with unilateral mastectomy with age group 45 or 55. All subjects were performed Shoulder ROM, postural and Thoracic Expansion exercises for 6 weeks. The subjects who fulfilled the inclusion criteria were included in the study after obtaining an informed consent from all the subjects and they were assessed at baseline, post-op day 1, at the time 0.87. The pre and post score comparison showed clinically statistical significance with $p < 0.05$. This study concludes that shoulder ROM Exercises, were effective in reducing Restriction of shoulder on affected side and thoracic expansion exercises increases the thoracic expansion and postural exercises correct the posture in patients who undergone unilateral mastectomy.

KEYWORDS

Mastectomy, Shoulder ROM Exercises, Postural exercises, Thoracic expansion exercise.

INTRODUCTION

Breast cancer refers to cancer originating from Breast tissue and it is most commonly involved in inner lining of milk ducts of the lobules which supply the ducts with milk⁽¹⁾. It is second most type of non-skin cancer and the fifth most common cause of cancer death.⁽¹⁾

- **Clinical Features Includes** - Women with breast cancer complaints of a lump. Classically this is hard, painless, immobile and demonstrates a degree of fixity to surrounding tissues, overlying skin or underlying pectoralis muscle.⁽²⁾ Lumps may be visible on inspection and may cause distortion of the breast on elevation of the arms or when tensing the pectoral muscles.⁽³⁾
- **Diagnosis**- Mammography, Ultrasonography, Thermography - Infrared photography gives a pictorial representation of heat patterns on the surface of the breast, which may indicate signs of abnormality, CT, Galactography, Biopsy (Fine needle aspiration) . complication is recurrence. It may⁽⁴⁾ local or regional (Skin or soft tissue near the mastectomy site , axillary or internal mammary lymph nodes) / Distant (most commonly involving the bone, lung, brain and liver).⁽⁴⁾
- **Management** - adjuvant therapy, trastuzumab (herceptin) is a monoclonal antibody.⁽⁵⁾
- **Types Of Mastectomy**- modified radical mastectomy (mrm), skin sparing mastectomy, nipple areolar sparing mastectomy.⁽⁶⁾
- **Indications** : Tumor involving the nipple areolar complex, The tumor is larger than 7cm, The tumor exhibits extensive intra ductal disease involving multiple quadrants of the breast., Women cannot imply with Radiation Therapy.⁽⁶⁾
- **Contraindications** : Mastectomy is usually not used for stage 1 & 2 tumors unless the client prefers this approach.

Need Of The Study

- Breast cancer is a malignant tumor which begins in the cells of the breast. Clinical symptoms include cyst, lumps in the breast region. Removal of breast tissue is called as mastectomy.
- Mastectomy is highly prevalent in females and has been increasing day by day. Mastectomy results in decrease in thoracic expansion, shoulder ROM, and postural changes which in turn affects the QOL.
- There are very few studies which focus on the effects of exercises on thoracic expansion, Shoulder ROM and posture in patients with unilateral mastectomy.
- Hence, this study focusses on the effects of Thoracic Expansion exercises, Shoulder ROM Exercises and postural exercises on

Thoracic expansion, shoulder ROM and Posture in unilateral post mastectomy individuals

Aim Of The Study

The present study aim is to know the effect of Thoracic expansion exercises, shoulder ROM exercises and postural exercises on thoracic expansion, shoulder ROM and Posture in individuals undergoing unilateral mastectomy.

Objectives Of The Study

- To find out the effect of thoracic expansion exercises on thoracic expansion with Inch tape in cms in unilateral post mastectomy individuals.
- To find out the effect of shoulder ROM exercises on Shoulder ROM with Goniometer in degrees in unilateral post mastectomy individuals.
- To find out the effect of postural exercises on posture with Postural Grid in degrees in unilateral post mastectomy individuals.

Materials And Methodology

Paper and pen for documentation, Paper and pen for documentation in degrees, Inch tape to measure thoracic expansion in cms, Postural grid to measure posture in degrees.

Methodology

- **Study Setup**: Svims Hospital, Tirupati
- **Study Design**: Pre and post experimental design.
- **Study Duration**: 6 weeks duration
- **Sampling Size**: 30

Inclusion Criteria :

- Women aged 45 to 55 with breast cancer
- Clinically diagnosed with imaging (Mammography)
- Unilateral mastectomy subjects (pre op & 1st post op day)⁽⁷⁾

Exclusion Criteria

- Subjects Who were unable to understand and /or perform any of the procedures.
- Underlying respiratory problems, musculoskeletal disorders (kyphosis)
- Patients other than unilateral mastectomy
- Patients who were not willing to participate in study.⁽⁸⁾
- Patients who are unstable.

Outcome Measures

- Thoracic expansion is measured by inch tape in cms. It is used to measure thoracic expansion at axillary & xiphoidal level.
- Shoulder ROM is measured by Goniometer in degrees. It is used to measure shoulder Abduction, External rotation & flexion.
- Posture is measured by Postural Grid in degrees. It is used to measure the elevation of shoulder on the affected side.

Study Procedure

- This study was commenced after obtaining permission from the institutional ethics committee. (IEC No - 1700)
- The subjects who fulfilled the inclusion criteria and after explaining the study procedure an informed consent form was obtained were included in the study. The baseline measurements such as Thoracic expansion measurement, Shoulder ROM and Posture were measured with Inch tape, goniometer and postural Grid respectively in pre-operative phase.
- On the first post op day, these measurements were taken again to know the difference between these measurements pre and post operatively.
- Physiotherapy treatment - Shoulder ROM Exercises, Thoracic expansion exercises and postural exercises to improve Shoulder ROM, Thoracic expansion and posture.
- ROM - measured by goniometer, Thoracic expansion - measured by inch tape, Posture - measured by posture grid. Shoulder ROM Exercises includes Shoulder Abduction, flexion and External rotation. The active ROM of flexion, Adduction and external rotation of the shoulder was evaluated with a goniometer.

Treatment Protocol

• Thoracic Expansion Exercises

Pectoralis major stretching

Pectoralis minor stretching⁽¹⁰⁾

• Shoulder ROM exercises

Shoulder Flexion

Shoulder Extension

Shoulder Abduction movements

• Postural Exercises

(strengthening of trapezius, levator scapular, rhomboid muscles)⁽¹²⁾

Mode	Frequency	Duration	Intensity
Shoulder rom exercises	15 reps, sets- 3/6 days/week	15 mins	Mild /moderate
Postural exercises	15 reps, sets- 3/6 days/week	15 mins	Mild /moderate
Thoracic expansion exercises	15 reps, sets- 3/6 days/week	15 mins	Mild /moderate

Statistical Analysis

- Data was analysed using SPSS software version 23.
- Individual data was analysed by intension to treat all continuous data was assessed for normality.
- Continuous data was described using mean and standard deviation. Dichotomous outcomes were presented as risk ratios with 95% confidence intervals using **paired T- TEST** Difference in the outcome was compared within the group.
- The "p" value < 0.05 was considered statistically significant.

RESULTS:

- 30 subjects between the age group 45 to 55 with The Mean age of 50.87 ± 4.42 and with a mean BMI of 23.75 ± 2.18. The baseline measurements of Shoulder Extension 80.63 ± 2.99, Shoulder Abduction 161.80 ± 6.98, Shoulder Flexion 159.23 ± 7.98, Posture of shoulder 0.37 ± 0.67, chest expansion at axillary level 2.49 ± 0.41 and chest expansion at xiphisternal level was 2.81 ± 0.31.
- A paired sample T-Test was performed to evaluate the significance of the treatment intervention in unilateral Mastectomy individuals. The mean values of pair-1 (-16.13 ± 3.03) with 't' value -29.21, pair-2 (-47.07 ± 2.41) with 't' value -107.15, pair-3 (-30.93 ± 3.08) 't' value -54.93, pair-4 (-22.57 ± 5.04) with 't' value -24.55, pair-5 (-65.97 ± 6.08) with 't' value -59.46, pair-6 (-43.40 ± 6.91) with 't' value -34.39, pair-7 (-24.77 ± 6.66) with 't' value -20.36 with p value of 0.00 and pair-8 (-113.20 ± 266.76) with 't' value -2.32, and p=0.03.
- This shows that there was a statistically significant increase in shoulder ROM after the subjects received shoulder ROM exercises
- The mean value of pair 9 (-88.43 ± 267.51) with t-value of -1.81 and

p-value is 0.08 which showed that there was no statistical significant difference in shoulder flexion ROM after the subjects received the shoulder ROM exercises.

- The paired sample t-test was performed to evaluate the significance of treatment intervention in subjects the posture showed a mean of pair-11 (1.37 ± 0.45) with t-value 16.50, pair-12 (1.37 ± 0.45) with t-value 16.50, pair-13 (-0.71 ± 0.19) with t-value -20.07, pair-14 (-1.01 ± 0.22) with t-value -25.13 and p=0.00. This showed that there was a statistically significant increase in posture after the subjects received postural exercises.
- The paired sample t-test was performed to evaluate the significance of treatment intervention in subjects the chest expansion showed a mean of pair-15 (-0.31 ± 0.16) with t-value -10.52, pair-16 (-0.63 ± 0.25) -10.52, pair-17 (-0.29 ± 0.12) -13.46, pair-18 (-0.35 ± 0.22) -8.79 are **p<0.05**.

		Paired Differences				t	df	P Value	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	ShEx_Pd1 - ShExDis	-16.13	3.03	.55	-17.26	-15.00	-29.21	29.00	.00
Pair 2	ShEx_Pd1 - ShEx_6	-47.07	2.41	.44	-47.97	-46.17	-107.15	29.00	.00
Pair 3	ShExDis - ShEx_6	-30.93	3.08	.56	-32.09	-29.78	-54.93	29.00	.00
Pair 4	ShAb_Pd1 - ShAbDis	-22.57	5.04	.92	-24.45	-20.69	-24.55	29.00	.00
Pair 5	ShAb_Pd1 - ShAb_6	-65.97	6.08	1.11	-68.24	-63.70	-59.46	29.00	.00
Pair 6	ShAbDis - ShAb_6	-43.40	6.91	1.26	-45.98	-40.82	-34.39	29.00	.00
Pair 7	ShFlx_Pd1 - ShFlxDis	-24.77	6.66	1.22	-27.25	-22.28	-20.36	29.00	.00
Pair 8	ShFlxDis - ShFlx_6	-113.20	266.76	48.70	-212.81	-13.59	-2.32	29.00	.03
Pair 9	ShFlxDis - ShFlx_6	-88.43	267.51	48.84	-188.32	11.46	-1.81	29.00	.08
Pair 11	Pos_Pd1 - Pos_6	1.37	0.45	.08	1.20	1.54	16.50	29.00	.00
Pair 12	PosDis - Pos_6	1.37	0.45	.08	1.20	1.54	16.50	29.00	.00
Pair 13	Ar_Pd1 - ArDis	-0.71	0.19	.04	-.78	-.63	-20.07	29.00	.00
Pair 14	Ar_Pd1 - Ar_6	-1.01	0.22	.04	-1.10	-.93	-25.13	29.00	.00
Pair 15	ArDis - Ar_6	-0.31	0.16	.03	-.37	-.25	-10.52	29.00	.00
Pair 16	Xa_Pd1 - Xa_6	-0.63	0.25	.05	-.73	-.54	-10.52	29.00	.00
Pair 17	Xa_Pd1 - XaDis	-0.29	0.12	.02	-.33	-.24	-13.46	29.00	.00
Pair 18	XaDis - Xa_6	-0.35	0.22	.04	-.43	-.27	-8.79	29.00	.00

- This shows that there was a statistically significant increase in chest expansion after the subjects received chest expansion exercises.

DISCUSSION:

- The study included 30 subjects who undergone unilateral mastectomy and treated with shoulder ROM Exercises, Postural Exercises and Thoracic expansion exercises.
- The shoulder ROM, posture and Thoracic expansion were measured at baseline (pre-op), post-op-1, at the time of discharge and after 6 weeks.
- This study revealed that intervention increased the Shoulder ROM, Thoracic Expansion and improved posture on affected side.
- **Tamkhatlyas, Affanet.al (April 2022)** Conducted a study on - comparative effects of pre-operative versus post-operative shoulder rehabilitation program Mastectomy patients: A cross section Total 50 subjects were taken and Outcome measures were DASH for shoulder and NPRS Scale for pain. This study suggested that there is significant difference between better outcomes in terms of improvement in function, pain and range in patients having combination protocol i.e. pre & post operative rehabilitation protocol in patients of mastectomy as compared to post-operative Rehabilitation protocol alone.⁽⁸⁾
- **Sri Aurobindoprasad Das et.al (27th Aug -2018)** conducted a study on - Effect of exercise on shoulder function and morbidity following mastectomy with axillary dissection in patients with breast cancer: A Prospective randomized clinical study - 75 patients were included in the study. exercise group (n=38) and no exercise group (n=37), patients in exercise group were given a set of 19 active/ active assisted ROM Exercises and strengthening exercises with frequent follow up. Pain score, shoulder ROM were better in exercise group compared to no exercise group and this difference was found to be significant (p<0.001). This study suggested that exercise interventions resulted in significantly reduced pain, improved shoulder ROM and lowered ADL's impairment. Exercise intervention significantly reduced the incidence of lymphedema, but there was no effect on strength.⁽¹²⁾
- Postural changes such as protraction of shoulder, a limited arm movement range, scapular misalignment, pain and altered sensitivity in the arm and axilla on the side of surgery.⁽¹⁰⁾

- **RostkowskaE, BakM, Samborskiet. al (2006)**- performed a study on postural evaluation through photogrammetry observed that the main alterations found in 85 mastectomised women were asymmetry of the shoulder girdle and the trunk and greater forward leaning of the trunk.it is also observed that operated side scapula was located higher than the opposite side,suggesting a change in the activation and co ordination of the stabilizing muscles of the scapula such as shortening and or decreased shoulder muscle strength⁽¹¹⁾

Study Limitations And Recommendations :

Study Limitations

- Sample size was small
- There is lack of control group.
- The study cannot be generalised as the sample size is smaller.

Future Recommendations

- The future study is recommended with large sample size.
- The future research can also be carried out with increased duration of treatment protocol.

CONCLUSION

This study included 30 unilateral mastectomy subjects and treated with Shoulder ROM Exercises, thoracic expansion exercises and postural exercises. Shoulder ROM was measured by goniometer,thoracic expansion was measured by Inch tape and posture is measured by postural grid.The study concludes that shoulder ROM Exercises, were effective in reducing Restriction of shoulder on affected side and Thoracic expansion exercises the thoracic expansion and postural exercises correct the posture in patients who undergone unilateral mastectomy.

Hence, Alternate hypothesis is accepted and the null hypothesis is rejected.This study contributes to the literature focusing on shoulder exercises, Thoracic expansion exercises and postural exercises and its effect on shoulder ROM ,Thoracic expansion and posture in unilateral mastectomy.

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