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EFFECTIVENES OF UPPER LIMB AEROBIC EXERCISES ON SHOULDER RANGE OF MOTION, PAIN AND FUNCTIONAL ACTIVITIES IN SUBJECTS WITH MODIFIED RADICAL MASTECTOMY

Physiotherapy

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ABSTRACT

Objectives: To analyse the effects of upper limb aerobic exercises on shoulder range of motion [flexion, abduction and external rotation] through Goniometer in subjects with Modified Radical Mastectomy. To analyse the effects of upper limb aerobic exercises on pain in subjects through NPRS with Modified Radical Mastectomy. To analyse the effects of upper limb aerobic exercises on functional activities through SPADI scale in subjects with Modified Radical Mastectomy. **Methodology:** The design of this study is an one group pre-test, post-test design in which 30 female subjects (from department of surgical oncology, SVIMS) were recruited by means of purposive sampling method after the fulfilment of the inclusion, exclusion criteria. Base line demographic details of the subjects were noted prior to the study and pre-values of shoulder range of motion [flexion, abduction and external rotation], pain and functional activities were recorded on pre and post with the help of outcome measures; Goniometer, NPRS[Numerical Pain Rating Scale] and SPADI[Shoulder Pain and Disability Index]. Aerobic exercise protocol was given for a period of 6 weeks. After completion of the aerobic exercise protocol the post values were measured by means of same outcome measures. **Results:** The results of the study showed that 6 weeks of treatment of upper limb aerobic exercises have a significant effect in increasing shoulder range of motion [flexion, abduction and external rotation], and reducing pain and improving functional activities in subjects with Modified Radical Mastectomy. **Conclusion:** The findings of the study indicate that the upper limb aerobic exercises were effective in improving shoulder range of motion, and reducing pain and improving functional activities in subjects with Modified Radical Mastectomy.

KEYWORDS

Upper limb aerobic exercises, Range of Motion, Pain, Functional activities, Modified Radical Mastectomy.

INTRODUCTION

According to the World Health Organization[WHO], cancer is the abnormal growth and proliferation of the cell that may start in any tissue or organ of the body and it has ability to migrate past their boundaries invading their near by areas.[1]

Breast cancer is the most commonest malignancy with potential high risk morbidity and mortality rate in women.[2]

Breast Cancer is a cellular anomaly. The risk factors that causes Breast Cancer includes skin, age, color, race, family history, hereditary genetic lesions, medications like oral contraceptives, ionizing radiations, obesity and low quality of life.[3]

The treatment of Breast Cancer is usually a lengthy process and requires intensive methods depending on its severity and it comprises surgery, radiation therapy, chemotherapy and hormone therapy.[4]

Of these, Breast Cancer is commonly treated through surgical method. The surgical methods include radical mastectomy [RM], modified radical mastectomy [MRM], simple mastectomy [SM], skin-sparing mastectomy [SSM], nipple-areolar sparing mastectomy [NSM].[5]

Surgical method posses many side effects not only limited to physical consequences but also it affects psychological and physical aspects of a woman affecting her overall health, present and future Quality Of Life.[6]

After breast cancer treatments, the most frequent disorder include upper extremity edema, shoulder mobility decline, neurological damages and movement disorders.[7]

Several issues of Breast Cancer includes pain in the upper part of the body and limb, psychological tensions, decrease in self-confidence, disorder in mental image of the body, lack of participation in social activities and reduction in Quality Of Life.[8]

The complications of Breast Cancer includes reduced Range Of Motion of shoulder joint, muscle weakness, post-mastectomy pain syndrome, lymphedema, functional limitations and postural disorders, difficulty in lifting objects, painful discomfort, abnormal appearance and restricted arm movement when dressing etc.[6,9]

Need Of The Study

Now-a-days, modified radical mastectomy is one of the most common procedure for breast cancer. Modified radical mastectomy, causes more pain and there must be the decreased shoulder range of motion which effects the functional activities.

There were only few studies on aerobics in subjects with breast cancer patients but there were very few studies on effect of upper limb aerobic exercises on modified radical mastectomy. Hence, this study is to find out the effect of upper limb aerobic exercises on shoulder Range of Motion, pain and functional activities in modified radical mastectomy.

Aim Of The Study

The aim of the study is to know the effectiveness of upper limb aerobic exercises on shoulder range of motion, pain and functional activities in subjects with modified radical mastectomy.

Objectives Of The Study

1. To find out the effectiveness of upper limb aerobic exercises on shoulder range of motion using Goniometer in subjects with modified radical mastectomy.
2. To find out the effectiveness of upper limb aerobic exercises on pain using NPRS [Numerical Pain Rating Scale] in subjects with modified radical mastectomy.
3. To find out the effectiveness of upper limb aerobic exercises on functional activities using SPADI [Shoulder Pain and Disability Index] in subjects with modified radical mastectomy.

METHODOLOGY

Materials used

1. Universal goniometer [180°]
2. Numerical Pain Rating Scale [NPRS]
3. Shoulder Pain And Disability Index [SPADI]

METHODS

Study design: Single group pre-test and post-test design [Experimental study]

Study duration: 6 Weeks

Study setting: College of physiotherapy and post surgical oncology ward, Sri Venkateswara Institute of Medical Sciences[SVIMS], Tirupati

Study setting: Department of Surgical Oncology, SVIMS

Study method: Purposive sampling

Sample size: 30

Inclusive criteria

1. Age : between 30 to 65 years
2. Subjects with modified mastectomy only

Exclusive criteria

1. Age : Below 30 and above 65 years
2. Any cardiac and neurological problems
3. Any other musculoskeletal problems in cervical and upper limb
4. Subjects along with chemotherapy
5. Subjects along with radiotherapy
6. Subjects with other types of mastectomy procedures

Ethical Clearance :

Ethical clearance was obtained from institutional ethical committee [code no : 1541]

Procedure

We has also taken prior permission from the subjects for the study by with proper explanation about the study completely. The subjects taken in the study A total of 30 subjects were taken for this study. An Experimental study was conducted in SVIMS, Tirupati for a duration of 6 weeks from January to October 2023. Patients reffered from department of surgical oncology ward, SVIMS.

After explaining the purpose of the study to the subjects, written informed consent was obtained from the subjects. The demographic data of subjects along with the pre-assessment of shoulder range of motion, pain and functional activities through Goniometer, NPRS and SPADI were recorded on the 2nd post operative day who undergone through modified radical mastectomy surgery. Subjects underwent the upper limb aerobic exercises treatment protocol for 6 weeks[3 days per week]. The post assessment of shoulder range of motion, pain and functional activities through Goniometer, NPRS and SPADI were recorded after the completion of the 6 week protocol of upper limb aerobic exercises. Two subjects were dropped out on the 3rd week of the treatment protocol due to unknown reason.

Treatment Ptotocol:
DAY 2 to DAY 10
Post Operative Day
2-4 days: Finger extension, fisting, wrist bending, elbow flexion and extension, and small range of shoulder joint movements

5-8 days: Use affected limb to wash their face, comb their hair, touch the contralateral shoulder and ipsilateral ear with the affected side hand

>8 days: Arm swing [front and back] raise the affected limb to perform finger climbing activities

- Include 6 weeks of aerobic exercises and strength training.
- 3 days per week.
- Day 1 includes aerobic exercises only.
- Day 2 and day 3 includes both aerobic exercises followed by strength training.
- Each session lasts about 40 minutes includes 5 minutes of warm-up phase, 15 minutes of exercise phase and 5 minutes of cool-down or stretch phase.

Warm-up Phase

- Wrist circles
- Elbow flexion and extension
- Arm swing [front and back]
- Forward and backward shoulder rotations
- Small Active Range of Motion ecercies
- Finger climbing activities

Warm-up phase lasts about 5 minutes.

Exercise Phase

- Twist and reach
- Touch the sky
- Alternating bust circles
- Golf circles (1) Forward golf circles (2) Backward golf circles
- Wind mills (1) Forward wind mills (2) Backward wind mills
- Peek-A-Boo
- Punching exercises

Exercise phase lasts about 15 minutes

Cool Down/Stretch Phase

- Deep breathing exercises
- Biceps stretch
- Triceps stretch
- Deltoid stretch

Each one 20 seconds and 3 repetitions Cool down phase lasts about 5 minutes.

WEEK 1-2 :
DAY 1 : Aerobic exercises only [2 circuits of exercise period]

DAY 2 and 3: Aerobic exercises and strength training [1 circuit of exercise period and 10 reps, 2 sets with 1 kg weight

WEEK 3-4 :
DAY 1 : Aerobic exercises only [3 circuits of exercise period]

DAY 2 and 3: Aerobic exercises and strength training [2 circuit of exercise period and 10 reps, 2 sets with 1 kg weight

WEEK 5-6 :
DAY 1 : Aerobic exercises only [3 circuits of exercise period]

DAY 2 and 3: Aerobic exercises and strength training [2 circuit of exercise period and 10 reps, 2 sets with 1.5 kg weight

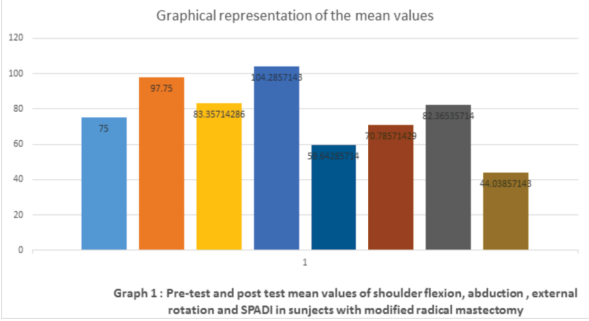
Outcome Measures :

1. RANGE OF MOTION :UNIVERSAL GONIOMETRY[180°]
2. PAIN :NUMERICAL PAIN RATING SCALE
3. FUNCTIONAL ACTIVITIES:SPADI

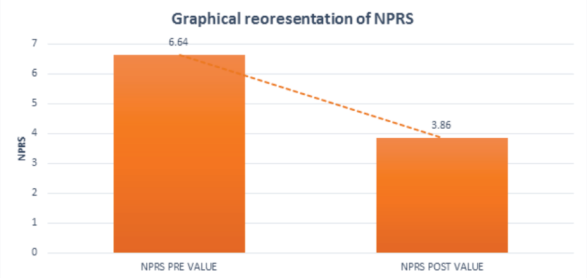
Data Anaylsis And Results

Table 1: Shows the statistical analysis of flexion, abduction and external rotation of shoulder joint, NPRS and SPADI in subjects with modified radical mastectomy.

Component	N	Mean ± SD of pre-test	Mean ± SD of post-test	t-value	p-value
Shoulder flexion	28	75 ± 5.70	97.75 ± 5.67	16.0377	0.0001
Shoulder abduction	28	83.21 ± 3.17	104.29 ± 3.25	21.3001	0.0001
Shoulder external rotation	28	59.64 ± 4.76	70.79 ± 4.57	17.5308	0.0001
NPRS	28	6.64 ± 0.73	3.82 ± 0.61	15.800	0.0001
SPADI	28	82.55 ± 3.95	44.03 ± 3.34	41.9427	0.0001



Graph 1 : Pre-test and post test mean values of shoulder flexion, abduction , external rotation and SPADI in sunjects with modified radical mastectomy



Graph 2 : Shows mean of pre and post values of NPRS in subjects with modified radical matesctomy

The above statistical data showed that the pre intervention mean shoulder flexion ROM increased significantly from 75 ± 5.70 to 97.75 ± 5.67 with t-value 16.0377 and p-value < 0.001, pre intervention mean shoulder abduction ROM increased significantly from 83.21 ± 3.17 to 104.29 ± 3.25 with t-value 21.3001 and p-value < 0.001, pre intervention mean shoulder external rotation ROM increased significantly from 59.64 ± 4.76 to 70.79 ± 4.57 with t-value and p-value < 0.001, correspondingly pre intervention mean SPADI decreased significantly from 82.55 ± 3.94 to 44.03 ± 3.34 with t-value 41.9427 and p-value < 0.001, pre intervention mean NPRS decreased significantly from 6.64 ± 0.73 to 3.82 ± 0.61 with t-value 15.8000 and p-value < 0.001.

DISCUSSION

Breast cancer surgery may cause tightness, heaviness, pain, decrease in range of motion, stiffness, weakness, swelling, tingling, and numbness in the arm.

ROM limitation is caused due to scar tissue formation after the surgery induced fibrosis and defensive posture that does not move forward pain.[10]

In terms of effects of exercise, is known to provide basic pump mechanism for contraction of skeletal muscle's venous drainage, and it increases protein intake and lymph circulation in the body.[10]

The previous studies related to upper extremity exercise showed that upper extremity exercise relaxes the sympathetic nervous excitement, and by adjusting the lymphatic system, it plays helping role in long-term management in lymphedema.

Several studies stated that resistance aerobic exercise in home or gym help joint range movements.[11]

According to the results of this study found that 6 weeks [three days per week] of upper limb aerobic exercises helps in improvement in shoulder range of motion, pain reduction and improvement in functional activities. Exercise reduce recurrence of pain, and functional disability.

The subjects showed significant improvement in the shoulder range of motion [flexion, abduction, external rotation] when compared with pre and post values through upper limb aerobic exercises.

The subjects showed significant improvement in pain reduction when compared with pre and post values through upper limb aerobic exercises.

Further research can be done by increasing the sample and examining the effects of upper limb aerobic exercises on different aspects like stiffness, heaviness, swelling in different population.

Limitations Of The Study

- Long term follow-up could not be assessed.
- This study has been concluded on small sized sample only.

Recommendations Of The Study

- Further studies may be extended with more advanced exercises with larger sample.
- Regular follow-up may be needed.

CONCLUSION

6 weeks exercise protocol of upper limb aerobic exercises on modified radical mastectomy subjects shows highly significant improvement on the components shoulder range of motion [flexion, abduction, external rotation], pain and functional activities.

So that null hypothesis rejected and alternate hypothesis rejected.

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