

Correlation between Shoulder Range of Motion, Upper Extremity Disability and Quality of Life in Female Breast Cancer Survivors Post Modified Radical Mastectomy: A Pilot Study

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ABSTRACT

Background: Many complications may occur after modified radical mastectomy (MRM) such as restricted shoulder mobility, wound infection, seroma formation, pain and lymph edema.

Purpose: To find the correlation between shoulder flexion and abduction range of motion (ROM) with upper extremity disability and quality of life in female post MRM.

Methodology: A cross section observation study was conducted in a tertiary care hospital. A total of 20 breast cancer survivors who underwent MRM before 6 months or more were included. Their affected side shoulder flexion and abduction ROM was measured using universal goniometer, upper extremity disability was assessed using Upper Extremity Functional Index (UEFI) and Quality of Life was assessed using WHOQoL-BREF questionnaire.

Results: Karl Pearson's correlation coefficient was used to find the correlation. Strong positive correlation was found between shoulder flexion ROM and UEFI score, physical, psychological and environmental domains, whereas moderate positive correlation was found between shoulder flexion ROM and overall QoL, these were statistically significant ($p < 0.001$). But there was weak positive correlation found between shoulder flexion ROM and social domain of WHOQoL-BREF which was statistically not significant ($p > 0.001$). Further strong positive correlation was found between shoulder abduction ROM and UEFI score, overall QoL,

physical and psychological domain and moderate positive correlation was found between shoulder abduction ROM and environmental domain whereas again weak positive correlation found with social domain which was statistically not significant ($p > 0.001$).

Conclusion: Decreased shoulder ROM can increase upper extremity disability and affect overall QoL in breast cancer survivors post MRM.

Key words: Breast cancer survivors, Modified Radical Mastectomy, Quality of Life, Shoulder ROM, Upper extremity disability.

INTRODUCTION

According to World Health Organization "Cancer is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body." Worldwide, Breast Cancer (BC) is the most common cancer in women, other than non melanoma skin cancer.^{1,2} Asia has 44% of world's BC deaths with 39% of overall new BC cases diagnosed.³

The primary treatment for BC may include Breast conserving treatment (BCT), Mastectomy, Radiation therapy, Induction chemotherapy, adjuvant chemotherapy, hormonal therapy and targeted therapy.⁴ Through the years, the management of BC

has evolved towards Mastectomies and BCTs.⁵ Mastectomy is usually preferred in advanced T stage. There are many types of mastectomy, such as simple mastectomy, subcutaneous mastectomy, skin-sparing mastectomy, nipple-sparing mastectomy, radical mastectomy and modified radical mastectomy.⁶

Modified radical mastectomy is the most common treatment of invasive breast cancer. It is the removal of all breast tissue from the affected breast with removal of lymph nodes from the armpit in the affected side of the body.⁶

Many complications may occur after modified radical mastectomy such as restricted shoulder mobility, shoulder dysfunction, wound infection, stiffness, seroma formation, pain and lymphedema.⁶ More than two third of post mastectomy patients suffer from shoulder pain and disability.⁷ The surgical incisions through the skin and fasciae will result in scar tissue formation which may impair normal gliding between skin related structures, fasciae, and muscles that are necessary for free and normal motion of the shoulder girdle can lead to restricted shoulder ROM. Moreover, adjuvant radiotherapy given to mastectomy site and axilla increases risk of impairment of shoulder function.⁹

Upper extremity disability (UED) is one among the foremost troublesome long-term complications of carcinoma treatment^{10,11,12}. It is now well established that carcinoma survivors have a high prevalence of arm/shoulder impairments which will persist for several years, and are related to long-term activity limitations, participation restriction, and general quality of life impact.¹³

After diagnosis, the QoL of women is highly affected, because of emergence of physical, psychological and social effects which ends up in change in attitude and expectations towards life. In this sense, professionals within the field of oncology have observed the need of knowing and assessing the life condition of patients in its

entirety, with the aim of increasing their survival rate and improving their QoL.

There can be many factors affecting the Quality of life of breast cancer survivors like post surgical ROM restriction, reduced overall strength, fatigue, pain, lymphedema, altered psychological state of mind, altered bodily appearance etc. Among all these factors ROM restriction can lead to disability and affect the Quality of life.

A study done by Chrischilles E¹⁰ states that rehabilitation practices that prevent and alleviate UED are likely to improve QoL for breast cancer survivors. They had included all types of mastectomies as well as breast conserving treatments. But as one of the study done by Eman M et al states that MRM remains the most commonly performed surgery for breast cancer today,⁶ there was a need to know the relation between shoulder range of motion with upper extremity disability and quality of life in breast cancer survivors post MRM.

METHODOLOGY

Design and setting

A cross section observational study was conducted in a tertiary care hospital.

Participants

Female breast cancer survivors aged between 18 to 55 years who underwent MRM before 6 months or more for breast cancer stage I to III were included in this study. The female who diagnosed with another carcinoma after MRM, had any history of shoulder injury before MRM, had any trauma or diseases affecting muscles and joints such as rheumatoid arthritis, skin grafting on or around the shoulder or any previous history of chronic illness such as diabetes, osteoporosis, renal failure, heart disease, pulmonary diseases, neurological dysfunction and females underwent any neck surgery and who refused to sign consent form were excluded from the study.

Procedure and Outcome measures

Each female participated in a single session in which they were given two

questionnaires: Upper Extremity Functional Index (UEFI) for upper extremity disability and WHOQoL-BREF for Quality of Life. They were asked to fill these questionnaires under examiner observation or the one who could not understand English were asked questions in their language and response was noted by the examiner. Each female's affected side shoulder flexion and abduction ROM was measured using universal goniometer.

- **Shoulder flexion ROM**

It was measured using universal goniometer. Subject was in supine position. The axis of goniometer was placed at greater tuberosity of humerus. Then subject was asked to flex her upper extremity and reading was recorded as Active ROM. After which subject's arm was passively flexed by therapist and the reading was recorded as Passive ROM. The normal shoulder flexion ROM is 0°-175° to 0°-180°.

- **Shoulder abduction ROM**

It was measured using universal goniometer. Subject was in supine position. The axis of goniometer was placed at One inch below the acromion process of the scapula. Then subject was asked to abduct her upper extremity and reading was recorded as Active ROM. After which subject's arm was passively abducted by therapist and the reading was recorded as Passive ROM. The normal shoulder abduction ROM is 0°-175° to 0°-180°.

- **Upper extremity disability**

UED was assessed using Upper Extremity Functional Index (UEFI). It consisted 20 items. The scores given to the 20 questions are added to give a highest possible score of 80. The lowest possible score is 0. A lower score indicates that the person is reporting increased difficulty with the activities as a result of their upper limb condition. UEFI shows the good validity and reliability for assessing upper extremity disability²⁵.

- **Quality of life**

The Quality of life was assessed using WHOQOL-BREF questionnaire. The survey in this study contained a total of 26 questions from WHOQOL-BREF which provides a fast profile of 4 areas (domains).

Domain 1: Physical

Domain 2: Psychological

Domain 3: Social

Domain 4: Environmental

There are also two items that are examined separately about an individual's overall perception of quality of life and overall perception of their health. The four domain scores denote an individual's perception of quality of life in each particular domain. Domain scores are scaled in a positive direction (i.e. higher scores denote higher quality of life). The mean score of items within each domain is used to calculate the domain score. Mean scores are then multiplied by 4 in order to make domain scores comparable with the scores used in the WHOQoL-100. WHOQoL-BREF is valid and reliable tool for assessing the Quality of Life of the patient.²⁶

Statistical analysis

SPSS ver.20 was used to analyse data. Descriptive statistics was used for demographic data such as age, weight, height and BMI. Karl Pearson's correlation coefficient was used to find relation of shoulder ROM with upper extremity disability and QoL. The 'p' value ≤ 0.001 was considered as significant.

RESULTS

The strong positive correlation was found between shoulder flexion ROM and UEFI score, domain 1, 2 and 4 of WHOQoL-BREF which was statistically highly significant ($p < 0.001$) whereas, moderate positive correlation was found between shoulder flexion ROM and overall QoL which was statistically significant ($p < 0.05$). A weak positive correlation was found between domain 3 and shoulder flexion ROM, which was not statistically significant ($p > 0.05$). Further strong positive

correlation was found between shoulder abduction ROM and UEFI score, overall QoL, domain 1 and 2 of WHOQoL-BREF which was statistically highly significant ($p < 0.001$) It was also found that shoulder

abduction ROM was moderately correlated with domain 4, which was statistically significant ($p < 0.05$) but weakly correlated with domain 3 of WHOQoL-BREF which was not statistically significant ($p > 0.05$).

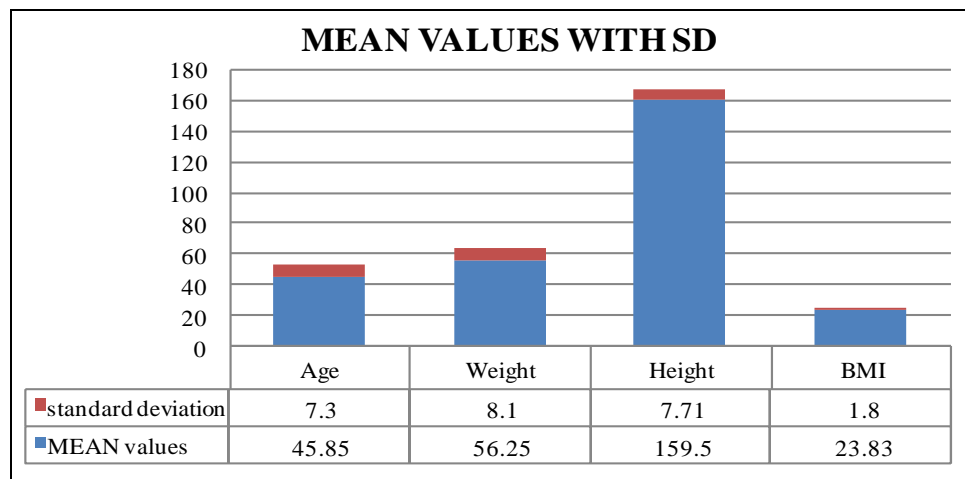


Figure 1: Graphical representation of demographic data with mean value and standard deviation

Table 1: shows the correlation between shoulder flexion and abduction ROM with UED and QoL of breast cancer survivors.

		UEFI	Overall QoL	Domain 1	Domain 2	Domain 3	Domain 4
Shoulder flexion ROM	r value	0.861	0.497	0.722	0.769	0.136	0.789
	p	0.000	0.026	0.000	0.000	0.568	0.000
Shoulder Abduction ROM	r value	0.865	0.730	0.711	0.729	0.09	0.647
	p	0.000	0.000	0.004	0.000	0.969	0.000

DISCUSSION

The present pilot study was conducted to find the correlation of shoulder ROM with UED and QoL in breast cancer survivors post MRM. Total twenty women who underwent MRM before six months or more with stage I-III of breast cancer diagnosed at tertiary care hospital and aged between 18 to 55 years were included. Majority of subjects were housewives and married.

In the present study the subjects who were operated before more than two years reported less ROM restriction. Majority of the subjects who reported restricted shoulder ROM were operated in last two years. There can be many reasons of the ROM restrictions. Restriction can be because of adjuvant radiotherapy which can lead to fibrosis of soft tissues or scar tissue formation. Other reasons include lack of health education, improper physical therapy exercises or lack of physical therapy treatment. There were also some subjects

complaining about the pain and lymphedema even after more than five years of MRM, which can also be one of the reasons of restricted shoulder ROM. The asymmetry of soft tissue mobility and mass distribution across the chest wall that arises from loss of a breast will have effect on upper limb movements and contribute to trunk or arm symptoms. That's why scapular and shoulder kinematics are commonly disturbed in post mastectomy patients.¹⁰

In present study strong positive correlation was found which was statistically significant ($p < 0.001$) between shoulder flexion and abduction ROM and Upper Extremity Functional Index score, which suggest that restriction in ROM can lead to increase in upper extremity disability in breast cancer survivors. This result is supported by the study done by Aatik Arsh et al, who concluded that more than two third of the breast cancer survivors post mastectomy suffer from shoulder pain and

disability. The reasons of disability may include restricted ROM, reduced muscle strength, lymphedema etc.⁴ other studies are also in favour of this result.^{5,6}

When ROM was correlated with overall QoL and each domains of WHOQoL-BREF, the strong positive correlation was found between ROM and physical health domain of WHOQoL-BREF whereas the moderate positive correlation with psychological and environmental domains of WHOQoL-BREF.

Physical health domain includes the activities of daily living, energy, fatigue, mobility, pain, discomfort, sleep, rest and work capacity. It is quite logical that restriction in shoulder ROM can affect all the above areas. Mastectomy results in shoulder stiffness and pain, thus leading to decrease musculature strength and limitation of ROM. These changes prevent post mastectomy patients from performing normal activities of daily living. Previous studies also reported that due to pain and limited shoulder ROM majority of post mastectomy subjects cannot perform ADL's effectively, which can affect the physical domain of QoL.

Other than ROM restriction there are many other factors like psychological support, educational level, living standard, personal relationships, economical status of family, support from family members, friends etc, which could affect individual's overall QoL. Thus this study results shows the moderate positive correlation between ROM restriction and overall QoL which is supported by the study done by Ashok K et al to study the QoL in woman breast cancer survivors post MRM.

In the present study, weak positive correlation was found between the social domain and shoulder ROM. It can be because the marital status can affect social domain positively and in present study majority of the participants were married.

Affection of marital status is significant in physical, psychosocial and social domains. Married subjects have more concern regarding health of their own and

other family members so that they could give maximum output to perform daily life activities. Married person may involve in better relations with multiple relatives, family friends and social support groups. This is easy to share their problems with spouse than other family members and friends in society.

The present study found the relation of restricted shoulder ROM with UED and QoL in breast cancer survivors post MRM. So to decrease the disability and improve the QoL, proper physical therapy plan should be implemented to increase ROM.

Study limitations

- Sample size was small. Thus, further confirmation of these results must be done in larger size population.
- Breast cancer survivors who had undergone MRM before 6 months and more were included in the study. Further study can be done with the definite time period.

CONCLUSION

Restricted shoulder ROM can lead to upper extremity disability and affect the Quality of Life of breast cancer survivors post MRM. So to decrease the disability and improve the QoL, proper physical therapy plan can be implemented to increase ROM.

Abbreviations

WHO-World Health Organization, BC-Breast Cancer, BCT-Breast Conserving Treatment, MRM-Modified Radical Mastectomy, ROM-Range of Motion, UED-Upper Extremity Disability, QoL-Quality of Life, UEFI-Upper Extremity Functional Index

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Conflict of Interest: There is no conflict of interest

Ethical Approval: Present study was approved by the Institutional Ethical Committee.

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