

The Relationship between Early Physiotherapy Intervention and Shoulder Joint Mobility among Breast Cancer Survivors in Sri Lanka

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Abstract - Breast cancer is the most common cancer among women worldwide, including Sri Lanka. Modified Radical Mastectomy (MRM) is the standard surgical management when the breast conservation is not considered as an option. However, common post-surgical complications of MRM include impairment of shoulder joint mobility and lymphedema which could be managed well with early physiotherapy intervention. This study was aimed to identify the relationship between shoulder joint mobility and early physiotherapy intervention among breast cancer survivors at Apeksha hospital, Maharagama, 74 female breast cancer patients referred to the Department of Physiotherapy for the first time were recruited for this study. Patients with history of shoulder joint injuries or other pathologies were excluded from the study. An interviewer-administered questionnaire was used to collect information of socio-demographic data and underwent surgical procedures. Shoulder joint Active Range of Motions (AROM) (flexion, extension, abduction, Internal Rotation (IR) and External Rotation (ER)) of the affected side was measured by universal goniometer following standard procedure. Delayed period to commence physiotherapy of the sample ranged from < 1 year to 17 years. According to the findings, the mean values of AROM of flexion, extension, abduction, IR, and ER were 1570±140, 510±50, 1370±220, 700±120, 750±80, respectively. A significant negative relationship showed between delayed physiotherapy intervention and shoulder joint AROM of flexion ($p=0.05$, $r=-0.82$), extension ($p=0.05$, $r=-0.54$), abduction ($p=0.05$, $r=-0.75$), IR ($p=0.05$, $r=-0.76$) and ER ($p=0.05$, $r=-0.74$). Therefore, shoulder mobility limitation increases with time of delayed physiotherapy intervention. Hence, it is advisable for patients to participate in

early physiotherapy interventions to reduce the level of shoulder immobility.

Keywords— Breast cancer, Shoulder mobility, Physiotherapy

I. INTRODUCTION

Breast cancer is a malignant tumor that develops from the cells in the breast and usually originates in the cells of the lobules or the ducts of the breast. With the time cancer cells have a potential to grow into nearby healthy breast tissue and make their way into the underarm lymph nodes, enabling the cancer cells to spread in the other distant parts of the body; metastasis (Cheifetz, 2010).

The Global cancer observatory estimated that there are nearly 2.3 million new cases representing breast cancer as the commonest type of cancer in worldwide in 2020. According to the Fernando *et al.* (2018) data from National Cancer Registry revealed a gradual, significant increase in the incidence of female breast cancer in Sri Lanka which also recorded that the cases was hundred times higher in women compared to men (Siegel *et al.*, 2019).

In general, there are many treatments options carry out to manage breast cancer such as local treatments and systemic treatments. (Nounou *et al.* 2015). Among local treatments, surgical management option Modified Radical Mastectomy (MRM) preferred as one of the standard surgical management for most of the stages in breast cancer that has been used for years since 1948, due to its better survival effect (Najeeb *et al.*, 2019). This surgery removes the entire breast tissue including skin, areola, nipple and most of the axillary lymph nodes. Following MRM with axillary clearance, breast cancer survivors have to struggle with post-

surgical complications that directly affect their quality of life (Merchant and Chen 2015). Shoulder joint mobility impairments are lying as the front liner complications post-surgically.

Shoulder joint is the most movable joint in the body and main joint that can be affected its functions by MRM due to its proximity to the chest. Since the human could stand up with the erect position, functions of upper limb provide maximal advantages to the day today life activities. With relevant to the shoulder mobility implications, upper limb movements potentially affect and lead to experience difficulties to perform movements and engage in activities using upper limb to maintain a comfortable quality of life.

Relative to shoulder mobility, Active Range of Motion (AROM) measures the available amount of movement of a joint which briefly shows the ability to move. Basic movements of the shoulder joint are flexion, extension, abduction, adduction, Internal Rotation (IR) and External Rotation (ER). Losing the ability to use the shoulder joint movements appropriately results in considerable difficulty in daily activities (Sugden *et al.*, 2013).

Early physiotherapy interventions help to prevent and reduce complications such as, limitations in shoulder movements among patients after breast cancer surgery (Reyes, 2018). Breast cancer survivors refer to the physiotherapy department within a short period post surgically or after ages and there is a clear variation for period from surgery to commence physiotherapy.

The purpose of this study was to identify whether is there any relationship between shoulder joint mobility and delaying physiotherapy among the breast cancer survivors who had undergone MRM with axillary clearance in Sri Lanka.

II. METHODOLOGY

This study is a a cross sectional study. 74 female newly referred breast cancer survivors following MRM with axillary clearanceto the department of physiotherapy, Apeksha hospital, Maharagama, Sri Lanka during the study period of July 2020 - February 2021 were recruited forthis study.

Patients with history of shoulder joint injuries or other pathologies before conducted the MRM were excluded from the study. A pretested Interviewer-administered questionnaire which was evaluated in

a pilot study was used to collect the information of socio-demographic data.

The timeperiodfrom the surgery performed date to the very first date of attending to the department of physiotherapy was calculated as the delayed period to commence physiotherapy for each participant.

AROM of the shoulder movements of shoulder flexion, extension, abduction, internal rotation and external rotationwere measured to assess shoulder mobility. Each movement was measured three times according to the standard procedure by Clarkson (2000) and Reese and Bandy (2009) using a universal goniometer and average values were calculated to get the exact AROM of each type of movement.

Shoulder flexion AROM was measured in comfortably seated position of the participant, palm facing medially while investigator stabilized the scapula and goniometer axis was placed at the lateral aspect of center of humeral head about 2.5cm inferior to the lateral aspect of acromion process along with stationary arm placed parallel to the lateral midline of trunk and moveable arm was placed parallel to the longitudinal axis of humerus, and participant was asked to move the arm in an anterior and upward direction in the available full range.

Same procedure as in shoulder flexion AROM measurement was followed to measure shoulder extension AROM along with participant was asked to move the arm in posterior direction in the available full range and for shoulder abduction participant was asked to move limb laterally and upward in the available full range.

In order to measure shoulder IR AROM participant was asked to lie on bed in facing upward; in supine position with shoulder abducted to 90°, elbow flexed to 90° and forearm in mid position while goniometer axis was placed on the olecranon process of ulna and stationary arm was placed perpendicular to floor along with movable arm was placed parallel to the longitudinal axis of ulna, pointing toward ulnar styloid process and participant was asked to move palmar side of hand towards the floor to the available full range.

Shoulder ER AROM was measured when participant was positioned same as for the shoulder IR measurement and was asked to move dorsum of hand towards the floor to the limit of motion.



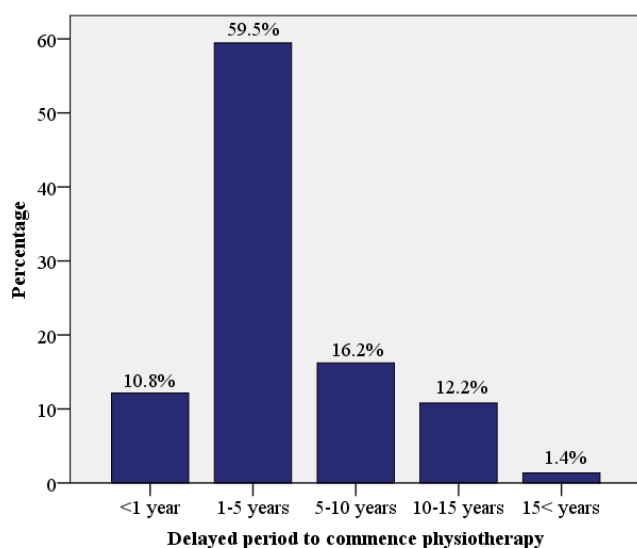
Figure 1. Measuring AROM of the shoulder joint abduction

The investigators wore the personal protective equipment kits, face masks, face shields, gloves during the whole procedure and equipment and beds were disinfected by participant to participant following the safety precautions. The Statistical Package for Social Sciences version 23 was used in data analysis purposes. Shapiro-Wilk test was used to assess the normality with the assumption made under the Sig. value > 0.05. Pearson correlation coefficient test was used to investigate the relationship between the shoulder joint mobility and delayed period to commence physiotherapy.

III. RESULTS AND DISCUSSION

Age of total study sample ranged from 35-70 years and mean age was 54 ± 8 . Delayed period to commence physiotherapy after surgery varied from less than 1 year to 17 years. Distribution of delayed period to commence physiotherapy among the participants shown in the Figure 2 and Table 1.

Figure 2. Distribution of delayed period to commence physiotherapy



	Frequency	Percentage
<1 year	9	12.2
1 - 5 years	44	59.5
5 - 10 years	12	16.2
10 - 15 years	8	10.8
15 < years	1	1.4
Total	74	100.0

Table 1. Distribution of delayed period to commence physiotherapy

Majority of the breast cancer survivors referred to the department of physiotherapy for their treatments within the 1-5 years of time post surgically. Similar findings were recorded by Bernaset *et al.*, (2018). The longest delayed time period to commence physiotherapy was 17 years in this study while a similar study of case reports review in America by Brennan and Weitz, (1992) recorded a new referral even after 30 years following MRM.

AROM of shoulder flexion ranged from 123° to 178° with the mean value of $157^{\circ} \pm 14^{\circ}$, extension ranged from 42° to 60° with the mean value of $51^{\circ} \pm 5^{\circ}$, abduction ranged from 89° to 175° with the mean value of $137^{\circ} \pm 22^{\circ}$, IR ranged from 41° to 90° with the mean value of $70^{\circ} \pm 12^{\circ}$ and ER ranged from 56° to 88° with the mean value of $75^{\circ} \pm 8^{\circ}$.

Hence the data was normal, in order to identify the relationship between two variables, parametric test Pearson correlation coefficient was used to investigate the relationship between the shoulder joint mobility and delayed period to commence physiotherapy. According to the statistical analysis a significant negative relationship was observed between delayed period to commence physiotherapy from surgery and AROM of the shoulder joint movements among the study population (see Table 2). The level of significant relationships were $0.7 <$ with the movements; flexion, abduction, external rotation, internal rotation whereas moderate relationship was found with extension.

	Period from surgery	
	Pearson Correlation	Sig. (2-tailed)
Period from surgery	1	0.00*
Flexion AROM	-0.82*	0.00*
Extension AROM	-0.54*	0.00*
Abduction AROM	-0.75*	0.00*
ER AROM	-0.76*	0.00*
IR AROM	-0.74*	0.00*

*correlation level significant at the 0.05 level

Table 2. Relationship between period from surgery to commence physiotherapy and AROM of shoulder joint movements

Similar results were reported by some others studied conducted by Oliveira *et al.*,(2009) and Mohammed (2016).

IV. CONCLUSION

In conclusion a significant negative relationship identified between the delayed period from surgery to commence physiotherapy with shoulder mobility in shoulder flexion, extension, abduction, internal rotation and external rotation. Accordingly, shoulder mobility limitations increase with time when there is a delay in commencing physiotherapy. These consequences are not being diagnosed or treated as often as they require. Hence, the patients are advisable to participate in early physiotherapy interventions to reduce the level of shoulder immobility.

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