

Patients with Shoulder Dysfunction After Mastectomy Can Benefit from Nurse-Assisted Home-Based Range of Motion Exercises

Waqas Ahmed, Farjad Afzal*

Department of Allied Health Sciences, University of Sargodha, Sargodha 40100, Punjab, Pakistan

*Corresponding author: Farjad Afzal, Farjad.afzal@uos.edu.pk

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Abstract: *Background:* Shoulder dysfunction is very common after mastectomy, and there is also less follow-up for physiotherapy services among patients with mastectomy. *Objective:* A study was conducted to determine the role of nurse-assisted home-based range of motion (ROM) exercises in patients with shoulder dysfunction after mastectomy. *Methods:* A pre- and post-interventional study design was used to collect data from 30 post-mastectomy patients. The subjects were selected on a voluntary basis. Informed consent was obtained from post-mastectomy patients who were discharged from different oncology hospitals in Pakistan prior to their inclusion in this study. After obtaining a baseline measurement, the patients were supervised with nurse-assisted ROM exercises at home. The nurse-assisted home-based ROM exercise program was designed for such patients, and the patients were followed-up for up to 1 month. The total duration of the study was 1 year from August 2015 to August 2016. Post-intervention measurement was performed at the patients' home. The difference in terms of pain reduction and ROM improvement at the shoulder joint was recorded using goniometric measurements and the 100 mm visual analogue scale (VAS). *Results:* The mean age of the 30 subjects was 39.83 ± 5.89 . The mean ROM of shoulder flexion before the exercise program was 106.03° , which improved to 133.93° after 1 month of the exercise program. The mean ROM of shoulder abduction before treatment was 94.83° , which improved to 127.13° after 1 month of supervised exercise program. The mean ROM of shoulder rotation before the exercise program was 127.53° , which improved to 152.03° after 1 month of the exercise program. *Conclusion:* The nurse-assisted home-based shoulder ROM exercise program is effective in terms of improving the range of motion and reducing pain at the shoulder joint in post-mastectomy patients.

Keywords: Mastectomy; Shoulder; Dysfunction; Adhesive capsulitis; ROM; Exercises

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1. Introduction

Shoulder pain and stiffness is one of the most common complications after mastectomy if not rehabilitated. The reason this study was conducted is that there are a lot of post-mastectomy patients in Pakistan who do not undergo the home-based exercise rehabilitation plan and very little work has been done to determine the effectiveness of this home-based exercise plan for mastectomy patients in Pakistan. The aim of this study was to determine the effects and clinical outcomes of nurse-assisted home-based shoulder range of movement (ROM) exercises on 30 women who participated in this study. The exercise plan was initiated based on the American Cancer Society Guidelines, focusing on the frequency, exercise intensity, and progression, in order to achieve more benefits for the participating women in terms of their functional activities. In Brazil female population, the second most common neoplasm is invasive breast cancer, with

41,610 new cases diagnosed and 9,335 deaths in 2003^[1]. The overall survival rate is 5 years in 85% of the population with breast cancer in the United States^[2]. The increase in incidence rate of breast cancer in the United States is 1–2% per year^[3]. As breast cancer is more common in women age 50–64, its mortality rate is lower among the elderly^[4]. The most commonly diagnosed cancer in American women is breast cancer; one in eight women have the probability of developing breast cancer in their lifespan^[5]. In Australia, the prevalence (excluding non-melanoma skin cancer) is one in eleven women before age 75 years^[6]. Despite the advancements in tumor detection methods and surgical procedures to prevent complication and promote recovery, patients still develop complications after mastectomy, are these patients have to deal with the many complications resulting from the disease, especially those associated with the neuro-musculo-skeletal system. Among breast cancer survivors who had axillary lymph node dissection, at 5 years follow-up, 30–40% of them are affected by shoulder pain, 10–15% have lymph edema, and 15–30% have limited mobility, shoulder adhesion, and difficulty in carrying out activity of daily living^[7-11]. In order to reduce the risk of complications, there are improvements in the post-surgical care for these patients over the past two years in the form of improved rehabilitation plane of care^[12]. However, arm pain, shoulder stiffness, and arm swelling have been reported in more than one-third of women surveyed at six months or more after diagnosis^[13,14]. These impairments have distressing biopsychosocial effects on survivors as they make it difficult for survivors to carry out activities of daily living and basic self-care tasks^[15]. The support services for breast cancer compared to other cancers are not common and well-established in Pakistan. Evidence from clinical trials has suggested that unifactorial interventions, such as those with only educational, exercise, or psychosocial components, are efficacious in improving patients' subjective wellbeing and quality of life^[16,17]. They are also responsible for the restoration of fitness in patients^[18]. Breast cancer survivors who undergo exercise rehabilitation may realize greater improvements in terms of shoulder ROM and upper-body muscular endurance versus a group that is not under any exercise regimen. According to a systematic review, 75–85% of patients are able to return to work after rehabilitation^[18]. Rehabilitation plays an important role in preventing shoulder complications. However, in most of these studies, rehabilitation with upper-body exercises begins on the first day to one week to regain ROM and strength of the arm and shoulder. Additionally, the majority of these studies were conducted in a clinical environment rather than at home. There are only a number of studies that focused on home-based exercise plans commencing after a period of 3 months post-surgery. Therefore, this study was conducted to determine the effectiveness of nurse-assisted home-based ROM exercise plan in patients with shoulder dysfunction after mastectomy.

2. Methodology

Pre- and post-interventional study design was used to collect data from 30 post-mastectomy patients. The subjects were selected on a volunteer basis. Informed consent was obtained from post-mastectomy patients who were discharged from different oncology hospitals in Pakistan. A home-based ROM exercise program was designed for such patients, and the patients were followed-up for up to 1 month. The total duration of the study was 1 year from August 2015 to August 2016. The difference in terms of pain reduction and ROM improvement at the shoulder joint was recorded using goniometric measurements and the 100 mm visual analogue scale (VAS). The inclusion criteria were subjects with age less than 50 and those who had undergone mastectomy within the past 1 month. The data collection tool used was the 100 mm VAS. Goniometric measurements were used to record any change before and after treatment. SPSS for Windows, Version 16.0, was used for data analysis. Statistical significance was set at $P = 0.05$. Paired *t*-tests were performed to detect any differences between baseline and post-treatment shoulder ROM measurements and VAS pain scores.

3. Results

3.1. Shoulder range of movement before and after 1 month of supervised exercise program

The mean age of the 30 subjects was 39.83 years with a standard deviation (SD) of 5.89. The mean ROM of shoulder flexion before the exercise program was 106.03°, which improved to 133.93° after 1 month of supervised exercise program. The mean ROM of shoulder abduction before treatment was 94.83°, which improved to 127.13° after 1 month of supervised exercise program. The mean ROM of shoulder rotation before the exercise program was 127.53°, which improved to 152.03° after 1 month of supervised exercise program (**Table 1**).

Table 1. Shoulder ROM before and after the intervention

Movement	Before treatment	After treatment	Difference	p-value
Mean ROM of shoulder flexion (SD)	106.03° (13.44)	133.93° (13.27)	27.90° (15.41)	0.00
Mean ROM of shoulder abduction (SD)	94.83° (16.42)	127.13° (13.90)	32.30° (16.01)	0.00
Mean ROM of shoulder rotation (SD)	127.53° (11.93)	152.03° (9.60)	24.50° (13.27)	0.00

The mean improvement in the ROM of shoulder flexion was 27.90° (15.41), with a p-value of less than 0.05, indicating that the exercise program was effective for the subjects in terms of ROM improvement at the shoulder joint. The mean improvement in the ROM of shoulder abduction was 32.30° (16.01), with a p-value of less than 0.05, indicating that the exercise program was effective for the post-mastectomy subjects in terms of ROM improvement at the shoulder joint. The mean improvement in the ROM of shoulder rotation was 24.50° (13.27), with a p-value of less than 0.05, indicating that the exercise program was effective for the subjects in terms of ROM improvement at the shoulder joint.

3.2. Shoulder pain before and after 1 month of supervised exercise program

The mean reduction in shoulder pain was 27.03 (12.92), with a p-value of less than 0.05, indicating that the exercise program was effective for the subjects in terms of reducing pain intensity (**Table 2**).

Table 2. Shoulder pain score before and after the intervention

	Before treatment	After treatment	Difference	p-value
Mean VAS (SD)	69.37 (10.11)	42.33 (16.21)	27.03 (12.92)	0.00

4. Discussion

Females constitute 53% of the total population in Pakistan, and almost 12.5% of females suffer from breast cancer. The incidence of breast cancer in the United States has been increasing at a rate of 1–2% per year [3]. However, only about 1% of patients who are on medication follow-up are aware of physiotherapy, and the proportion of breast cancer patients is negligible in the physiotherapy department. All women are at risk of developing breast cancer but the risk is higher in older women. About 77% of breast cancer cases involve women over the age of 50. Shoulder pain and stiffness is one of the most common complications after mastectomy if not rehabilitated. The reason this study was conducted is that there are a lot of post-mastectomy patients in Pakistan who do not undergo the home-based exercise rehabilitation plan and very little work has been done to determine the effectiveness of this home-based exercise plan for mastectomy patients in Pakistan. Although there have been improvements in breast cancer management over the past two decades [12], complications associated with the musculoskeletal system, such as shoulder pain and stiffness, have been reported in more than one-third of women surveyed at 6 months or more after diagnosis

[13,14]. Breast cancer survivors who undergo exercise rehabilitation may realize greater improvements in terms of shoulder ROM and upper-body muscular endurance versus a group that is not under any exercise regimen. according to a systematic review, 75–85% of patients return to work after rehabilitation [18]. Postoperative morbidity from breast or axillary procedures for breast cancer is reported to be as high as 30%. According to Margaret McNeely *et al.*, the most effective way of preventing complications like shoulder stiffness and promoting recovery in breast cancer survivors is timely physical therapy rehabilitation programs. Impaired shoulder ROM was observed in less than 1% to 67% of patients, arm weakness in 9–28%, shoulder/arm pain in 9–68%, and lymph edema in 0–34%. In some cases, the occurrence of intercostobrachial nerve injury leads to sensory disturbances and pain in the axilla, medial upper arm, and chest wall. Hence, timely rehabilitation and exercise plans must be implemented to prevent such complications in breast cancer survivors. We collected the data of 30 patients after mastectomy. Paired sample *t*-test was performed, showing a significance level of less than 0.05. Therefore, we accept our alternative hypothesis that supervised exercise plans are effective for shoulder dysfunction after mastectomy in terms of reducing pain and improving ROM and reject the null hypothesis that supervised exercise plans are not effective for shoulder dysfunction after mastectomy in terms of reducing pain and improving ROM.

5. Conclusion

Shoulder supervised exercise programs are effective for improving ROM and reducing pain at the shoulder joint in post-mastectomy patients.

Disclosure statement

The authors declare no conflict of interest.

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