

Research Article**The Effect of 8 Weeks Chosen Aerobic Exercise on Shoulder Joint Mobility among Women Affected by Secondary Lymphedema after Breast Cancer Treatment****Sanaz Shiravi*, Seyyed Mahmoud Hejazi, Vahdat Boghrabadi**

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Abstract: One of the common side effects of breast cancer treatment is upper extremity lymphedema of the same side. Secondary lymphedema is a chronic disease leading to low function of the limb and disorder in the quality of life. The purpose of the present research is to study the effect of 8 weeks aerobic exercise on shoulder joint mobility (flexion, abduction, external rotation) among patients suffering upper extremity secondary edema after breast cancer treatments. 24 female patients affected by upper extremity secondary lymphedema after breast cancer treatments were divided into two control group (n=12) and experimental group (n=12) with introduction of cancer and surgery specialists based on inclusion and exclusion criteria. The experimental group took part in an 8 week exercise program including a 10 min warm up by stretching and a 20 min cycling on ergo meter at 55 to 70 percent target heart beat rate intensity and then a 10 min cool down by stretching which was held 3 sessions a week. Findings of the present research revealed that the experimental group participants' shoulder joint mobility had a significant difference with the control group after 8 weeks of aerobic exercise in three actions of flexion, abduction and external rotation ($p < 0.05$). Findings of the research showed that using chosen aerobic exercise can increase mobility of shoulder joint affected by lymphedema..

Keywords: breast cancer, lymphedema, aerobic exercise, shoulder joint mobility

INTRODUCTION

Breast cancer is recognized as the most widespread malignancy in women. It affects women's health and quality of life by happening about 35-44 new cases in each 100000 women annually [1-2]. Unfortunately, there is no definite statistics available regarding breast cancer spread in Iran; however, unofficial studies indicate that Iran is not one of low prevalence areas [3]. Common treatment of breast cancer is in the form of partial mastectomy with or without axillar lymph node removal or radical mastectomy combined with axillar lymphatic dissection [4].

Great advancements in the field of breast cancer have led to increased life of the patients. However, unfortunately, most of these treatments have several side effects and numerous negative consequences follow which decreases the quality of life among these patients [5].

After basic breast cancer treatments, the most frequent disorder include upper extremity edema, shoulder mobility decline, neurological damages leading to movement disorders and pain in the upper part of the body and limb [6-7]. Inflammation of the

hand on the same side that operation had been performed is a potential problem related to lymph nodes removal after mastectomy and can dramatically affect patients' daily activities [8]. Generally, breast cancer survivors are at risk of lymphedema during their whole life [9]. Occurrence of this incident is considered a painful and life changing event [10], which raises several issues such as pain and psychological tensions, decrease of self-confidence, disorder in mental image of body, lack of participation in social activities and reduction in quality of life [11].

A review of literature shows that severe lymphedema in hand area causes pain and deformation of the limb [12], additionally, it limits using hand or arm and patient may suffer from feelings such as heaviness, stiffness and pressure [13-14]. Also, patients may have to live with chronic wounds and infections which are common in severe lymphedema. [12].

Furthermore, due to decline in upper extremity mobility caused by muscle weakness and fear of pain, stiffness of the shoulder joint capsule which is one of the major reasons of decrease in the range of shoulder joint mobility. Blomquist et al. using normameter and isokinetic, respectively, measured range of motion and

power of shoulder movements in 75 patients who had mastectomy. They concluded that there is a significant reduction in the movement range of the affected shoulder compared to the healthy one. On the other hand, the power of the entire shoulder decreased, but the power of external rotation of shoulder demonstrated the highest decline [15].

Consequently, some medical specialists have always sought for non-invasive treatment methods for declining limb inflammation and the accompanied problems such as shoulder mobility reduction [16]. However, there is no definite healing for this disease and the purpose of treatment is reduction of inflammation, regaining the limb function and decline in limb discomfort feeling. Cure of lymphedema, at any case, is difficult and it is expensive and time-consuming even in the best circumstances.

In this vein, several studies investigated the effect of physical activity and sports on lymphedema among women affected by breast cancer. Courtney *et al.* demonstrated in a study that sports can have outstanding benefits for breast cancer survivors both during and after the treatment. Aerobic exercise at 50 to 75 percent of maximum heart beat rate can have positive effects in reducing vomit and fatigue, metastasis and also lymphedema after the surgery [17]. Moreover, numerous researches conducted in other countries have shown that patients participating in group exercise therapy had a significant decrease in side effects of this disease and have reported improvement in quality of life. Based on findings and researches conducted in the world and because we encounter this disease in our country, Iran, it was felt that this research on women affected by breast cancer would be beneficial. Therefore, the purpose of the current study is to explore the effect of chosen aerobic exercise on shoulder joint mobility among women affected by secondary lymphedema after curing breast cancer.

METHODOLOGY

This research adopted a quasi-experimental approach in which there were two experimental and control groups and an exercise intervention. The population under study includes women affected by secondary lymphedema after breast cancer treatment with an average age range of 46.5 who had mastectomy and were referred to Ghaem hospital, Mashhad University of medical Sciences. All treatments after the surgery (chemotherapy and radiotherapy) were similarly received. 24 women suffering upper extremity secondary lymphedema were randomly selected from among the population. The following study has been conducted under supervision of an ethical committee and patients were informed of the research purposes, voluntary participation in it and the chance of withdrawal at any stage of the research. All participants filled out the personal consent form prior to the exercise program. Participation criteria were as following:

Patients should have undergone the surgery for the first time. At least, 5 weeks have passed from the date of the surgery and they do not have any inflammatory disease involving the upper extremity (such as Rheumatoid Arthritis) and they must not have any problem limiting the exercise program (such as limb fractures). Some other required conditions are absence of any specific disease, absence of menstruation in the last six months and not participating in any sports or physical activity in this period. Then the sample was randomly divided into the control group (n=12) and experimental group (n=12). The amount of received calorie of the participants was collected from participants through food habits records questionnaire three days prior to pre-test, three middle days of the sixth week and three days prior to giving the post-test. They were recommended to follow their normal diet and avoid any change in their eating habits. They were also advised to avoid consumption of any supplement or drug without doctor prescription and in case doctor prescribed any drug they should inform the researchers.

In order to study the amount of shoulder joint mobility, the range of shoulder joint active movement including flexion, abduction and external rotation in supine position was measured using a 180 degree normameter and with the precision of 1 degree. Normameter is the standard tool for measuring movement range and has been confirmed in several validity and reliability researches [18, 19]. Any difference more than 10 degrees between the movement range of the healthy hand and the affected one was defined as limitation in the affected hand range of mobility. Given the importance of some background information such as age, education, marital status and the time of surgery; these data were collected from the patients.

The experimental group participants took part in an aerobic exercise for 8 weeks. Exercise sessions were held 3 times a week and each lasted roughly 40 mins at 55 to 70 percent maximum heart beat rate.

Initially, a 10 min stretching and warm up was done for preparation and avoidance of any damage resulting from low body temperature. After cycling for 20 mins on ergo meter at increasing speed, they were cooled down for 10 mins. During the entire exercise, participants' heart beat rate were controlled by ergo meter and Polar stethoscope was used several times to control the intensity of the exercise. It is worthy to note that the control group was asked not to do any sports or physical activity during the 8 weeks. Descriptive statistics including mean, standard deviation and frequency table were employed in this research to analyze the data. Kolmogorov-smirnov was used for normal distribution of data and independent t-test was implemented to compare the results. To illustrate any statistically significant difference, alpha was at 5%. The

present research used statistical package for the social sciences (SPSS 21.).

RESULTS

Sample of this study consisted of 24 women affected by secondary lymphedema after breast cancer treatment. There was no significant difference between the two groups (control and experimental) regarding demographic information or treatment before the

intervention. Statistical tests revealed that the experimental and control groups had no statistically significant difference in terms of height, weight and BMI (Table 1). Normality of all data was confirmed by Kolmogorov-smirnov test. Results of the independent t-test show statistically significant difference for limb area factors in participants’ three measured points followed by performing the exercise program (Table 2).

Table 1: Background variables categorized according to the two groups (Control and experimental)

Groups	Height (cm)	Weight (kg)	BMI
Control	163.75	64.41	24.41
Experimental	162.58	65.08	24.85

Table 2: Comparison between variations of the affected upper extremity shoulder joint mobility range (based on degrees) before and after the exercise in the two groups of control and experimental

Variables	Control group		Experimental group		p value
	Pre-test Mean \pm SD	Post-test Mean \pm SD	Pre-test Mean \pm SD	Post-test Mean \pm SD	
Flexion	132.08 \pm 3.42	139.66 \pm 3.553	133.44 \pm 3.977	133.3 \pm 4.417	0.001
Abduction	102.1 \pm 3.713	113.58 \pm 3.8	102.91 \pm 3.203	102.08 \pm 3.679	0.000
External Rotation	67.83 \pm 3.157	71.2 \pm 3.133	68.25 \pm 3.078	67.55 \pm 3.258	0.002

DISCUSSION

One of the side effects which occurs after the surgery among cancer patients is lymphedema. In this condition, hand or leg of the patient swells and becomes large which makes movement difficult. Therefore, s/he uses that limb less during daily activities. It may also result in stiffness and fragility of skin and raise infection problems. One of the methods of lymphedema treatment is exercising. They move lymph liquid, thus it will not gather in one area which leads to reduced edema and improvement of affected limb function [20]. Furthermore, aerobic exercises lead to reinforcement of patient’s stamina and it thus decreases fatigue and pain in them. It, therefore, influences muscle power and increases upper extremity movement range. This investigation revealed that the chosen aerobic exercise involving 8 weeks cycling on ergo meter at increasing speed leads to a significant increase in shoulder joint mobility factors in patients. Johnson *et al.* investigated the effect of aerobic exercises on arm lymphedema among women after breast cancer treatment. Results indicated a significant decrease in the size of arm and heart beat rate. Additionally, there was a significant growth in shoulder and arm mobility [21]. Also, Cheema *et al.* explored the aerobic exercise program in 27 breast cancer survivors with average age range of 57.7 who were affected by arm lymphedema. The amount of arm lymphedema, physical fitness, waist and hip circumference and weight of the participants were measured. Considerable progress was made in power

and stigma of the patients. Also, the size of waist and hip decreased too, although no change was noticed in their weight. These exercises had no significant effect on the amount of arm lymphedema; however, they increased the flexibility and degree of the shoulder joint on the operated side and could enhance patients’ quality of life [22]. It seems as if medicinal cure was not effective on lymphedema, hence physiotherapy is of great importance. In another study conducted in 2001, alternating pressure device, exercise and massage were used on 188 patients suffering secondary upper extremity lymphedema who had radical mastectomy surgery. It was concluded that by doing so, lymphedema disappeared in 17% of the patients. Averagely, the size of lymphedema among those with slight, average and high edema decreased 43%, 33% and 19 %, respectively [23]. It can be generally stated that aerobic exercises had a significant effect on the amount of secondary lymphedema and increase of shoulder joint movement after breast cancer surgery. However, further researches are needed to confirm the results.

CONCLUSION

Based on the findings of the present research, it can be stated that aerobic exercise activity has a significant effect on shoulder joint mobility among patients affected by secondary lymphedema after breast cancer treatment. According to this study outcomes and its comparison with several others, it seems that the

observed sports activities have positive effects on some side effects resulting from breast cancer treatments.

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