Biological Forum – An International Journal **7**(1): 1290-1294(2015)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

The effect of 8 Weeks of Chosen Aerobic Exercise on upper Extremity Lymphedema after Mastectomy in Women with Breast Cancer

Sanaz Shiravi, Saleheh Noor Nematollahi, Seyyed Mahmoud Hejazi and Mojgan Nadrzadh
Department of Physical Education and Sport Science,
Mashhad Branch, Islamic Azad University, Mashhad, IRAN

(Corresponding author: Sanaz Shiravi)
(Received 30 March, 2015, Accepted 29 April, 2015)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Background and purpose: One of the most common side effects in breast cancer treatment is the same side upper extremity lymphedema. Secondary lymphedema is a chronic disease which leads to low function of the limb and loss of beauty. The purpose of the current research is to study the effect of 8 weeks of aerobic exercise on the size of lymphedema in patients suffering upper extremity secondary lymphedema after breast cancer treatments. 30 female patients affected by upper extremity secondary lymphedema after breast cancer treatments were divided into two groups of control group (15) and experimental group (15) with the introduction of the surgeon and cancer specialists based on inclusion and exclusion criteria. The experimental group participated in 8 weeks of exercise held three sessions a week, including a 10 minute warm- up and stretching, 20 minutes of cycling on a bicycle ergo meter with an intensity of 55 to 70 percent target heart beat and then cooling down by stretching. Findings of the present research showed that compared to the control group, there was a significant decrease in the size of lymph edema of experimental group ($p<0.05$). Results of this research revealed that using aerobic exercise can decrease the upper extremity lymphedema size.

Keywords: breast cancer, lymphedema, aerobic exercise, lymphedema size

INTRODUCTION

Breast cancer is a disease in which malignant cells stemmed from breast tissue multiply irregularly and increasingly, without raising any defensive reaction by the immune system. It is one of the most prominent and most common diseases of women and one of the main causes of death among women aged 35 to 55 (Guarneri and Conte 2004). Findings show that this disorder is one of the most prevalent types of cancer among Iranian women (Harirchi *et al*., 2004). The usual treatment of breast cancer is surgery in the form of partial mastectomy with or without removing Axillar lymph nodes or radical mastectomy axillary lymphatic dissection (Maunsell *et al*., 1993). Extensive achievements in breast cancer led to increased survival of these patients. However, most of these treatments have several side effects and are followed with numerous negative consequences which lead to patients' decreased quality of life [17]. Right hand inflammation is a potential problem related to lymph node removal after mastectomy and can affect daily activities of the patient (Brennan and Miller 1998). Its occurrence has been reported to be 0 to 56 percent (Guarneri and Conte 2004).

Lymphedema is a chronic swell in ending sections which occurs due to lack of balance between capillary filtration and lymph depletion caused by disorder in lymph flow which is specifically created due to axillar lymph nodes removal (Williams *et al*., 2002, Meric *et al*., 2002).

in 2005, three million patients in America were diagnosed with lymphedema caused by breast cancer (Passik and McDonald 1998). Roughly one out of five breast cancer survivors is affected by lymphedema (Clark *et al*., 2005). In Australia, 11 thousand women are affected by breast cancer annually; from among whom, beyond 3 thousand suffer from hand lymphedema (Lacovara and Yoder 2006). axillarlymph nodes removal, radiotherapy, infection, obesity and old age are some factors causing increased risk of hand lymphedema (Armer and Stewart 2005,

Lucci *et al*., 2007). Lymphedema can happen at any time of patients' life, even weeks, months and years after the surgery or radiotherapy (Williams *et al*., 2005). during the initial period after the surgery or even 30 years later (Holcomb, 2006). Mostly it occurs during the 6 or 18 months after the surgery.

Patients usually struggle with swell, heaviness, weakness, pain in hand, hotness, high temperature, redness, numbness, low function of the limb and skin changes (Koul *et al*, 2007, Kearney and Richardson 2006). Majority of patients encounter varying degrees of difficulty with appearance, clothing and performing daily routine activities with hand (Marrs, 2007).

Hence, some medical specialists are always seeking for non-invasive treatment methods in order to decrease limb inflammation and the accompanying problems (Passik and McDonald 1998). However, there is no definitive cure for this issue and the purpose of treatment is to reduce the inflammation and return the limb normal function and decline limb discomfort. Lymphedema cure is generally difficult. It is costly and time-consuming in optimal conditions (Badger *et al*., 2004). In this domain, some studies have investigated the effect of physical activity and sports on women lymphedema affected by breast cancer. Courneya *et al.* (2002) showed that sports can have significant effects for breast cancer survivors during and after the treatment. Aerobics exercises at 50 to 75 percent maximum heart rate can have a positive effect on vomit and fatigue decrease, bone metastasis and also lymphedema after the surgery (Courneya *et al*., 2002). Several studies in other countries have reported the effect of physiotherapy on reduction of such side effects and life quality improvement. Kilbreth research indicated those patients participating in group sport programs had a significant decrease in the related side effects (Kilbreth and Refshauge 2006). In another study, Turner demonstrated that physiotherapy and group sports therapy leads to daily activity, life quality improvement and fatigue feelings reduction (Turner *et al*., 2006). According to evidence and conducted researches around the world and since our country, Iran, deals with the same issue extensively, the need for this research on women affected by breast cancer was identified and studied. Therefore, the purpose of the present research is to explore the effect of chosen aerobic exercise on lymphedema among women affected by breast cancer.

METHODOLOGY

The current study employs a quasi-experimental method, consisting two experimental and control groups and intervention exercise. The population under study was women affected by secondary lymphedema after breast cancer treatment with an age average of 46.5 who had mastectomy surgery and were referred to Ghaem hospital, Mashhad University of medical sciences. They have done all post surgery treatments (chemotherapy and radiotherapy) similarly. 24 women affected by upper extremity secondary lymphedema were randomly selected from the patients. This research has been monitored by the ethics committee and patients were informed of the purpose of the research plan, their optional participation in the study and freedom in withdrawal from the study at any stage of the research. Also, all patients had signed personal consent form prior to the exercise. Criterions of participation were as follow: patients must have undergone surgery for the first time. It must have passed at least 5 weeks from the date of their surgery and they should not have any inflammation disease involving upper extremity (e.g. rheumatoid Arthritis) or any problem limiting the exercise program (e.g. limb fractures). Other required conditions consisted: 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 two groups of control (n=12) and experimental (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 size of upper extremity lymphedema, the elbow area in the elbow joint line, 10 cm above elbow and 10 cm below it, was measured carefully using a 100 tape meter with the precision of a tenth of cm. The difference of more or equal to 1 cm between the healthy and affected hand area has been defined as lymphedema. Since some background information such as age, education, marital status and the time of surgery are influential; they 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.

At the beginning, 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.).

FINDINGS

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 of upper extremity lymphedema of the affected variations (in cm) before and after the exercise in the two groups of control and experimental.

	Experimental group		Control group		
Variables	**Pre-test Mean ± SD**	**Post-test Mean ± SD**	**Pre-test Mean ± SD**	**Post-test Mean ± SD**	**Amount of p**
Upper area of elbow	33.01±3.219	30.31± 3.342	32.66 ±3.143	33.83 ±3.588	0.001
Elbow area	32.41± 3.528	29.51± 3.964	31.58 ±3.146	32.25± 3.165	0.002
Lower area of elbow	30.01± 3.219	27.416 ±3.449	30.16± 3.459	30.91 ±3.146	0.001

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 (Gregory and Koldman 2006).

The findings of the present research showed that the chosen aerobic exercise including 8 weeks cycling on ergo meter at increasing speed resulted in significant decrease of affected limb area factors in patients. In a study, Fong *et al.* (2014) explored the effects of sports in upper extremity and blood flow of breast cancer survivors. 11 women suffering from lymphedema were in control group and 12 women affected by lymphedema were in the exercise group. After doing measurements, the exercise group performed the chosen exercises for 6 mins, and then both groups were measured in required factors again. In primary measurements, no significant difference was observed in the size of arm and wrist in both groups; however, in the second measurement and after performing exercises, the exercise group had a higher systolic and diastolic blood flow than the control group (Fong *et al.* 2013) investigated the effect of aerobic exercise on arm lymphedema of women after breast cancer treatment. Findings depicted a significant decrease in arm size and heart beat rate. Additionally, there was a significant rise in arm and shoulder movement (Johansson *et al.*, 2013). It seems that medicinal treatment was not effective in lymphedema, hence physiotherapy plays a crucial role as treatment.

In 2001, another study was conducted using alternating pressure device, exercise and massage 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 (Wozniewski *et al*., 2001). It can be generally stated that aerobic exercises had a significant effect on the amount of secondary lymphedema after breast cancer surgery. Therefore, it is recommended that cancer institutes use this exercise in rehabilitation of patients. Since the present research has been conducted in post surgery stage and among patients suffering lymphedema, it is suggested that future studies focus on the effect of exercises at different stages of treatment (chemotherapy and radiotherapy).

CONCLUSION

According to the findings of the present research, it can be stated that aerobic sports activities have a significant effect on secondary lymphedema after breast cancer surgery. Based on the outcomes of this study and comparing it with other researches, it seems that observed sports activities have positive effects on some side effects caused by breast cancer treatments.

ACKNOWLEDGMENTS

Hereby, I would like to express my gratitude to the participants of this study who cooperated with the researchers sincerely and also all people who assisted us in conducting the present research.

REFERENCES

Guarneri V and Conte P. (2004). The curability of breast cancer and the treatment of advance disease. *Eur J Nucl Med Mol Imaging.* **31**: 149-56.

Harirchi I, Karbakhsh M, Kashefi A and Momtahen AJ. (2004). Br- east cancer in Iran: resul of a multi-center study. *Asian Pac J Cancer Prev.* **5**: 24-7.

Maunsell E, Brisson J and Deschenes L. (1993). Arm problems and psychological distress after surgery for breast cancer. *Can J Surg.* **36**(4): 315-20.

Taleghani F, Parsa Yekta ZP and Nasrabidi AN. (2006). Coping with breast cancer in newly diagnosed Iranian women. *J Adv Nurs.* **54**(3): 265 -73.

Brennan MJ and Miller LT. (1998). Overview of treatment options and review of the current role and use of compression garments, intermittent pump and exercise in the management of lymphedema. *Cancer.* **83** (12 Suppl American): 2821-7.

Ahmed RL, Prizment A, Lazovich D, Schmitz KH and Folsom AR. (2008). Lymphedema and quality of life in breast cancer survivors: the Iowa Women's Health Study. *J Clin Oncol.* **26**(35): 5689-96.

Williams A, Vadgama A ,Franks PJ and Mortimer PS. (2002). A randomized controlled crossover study of manual lymphatic drainage therapy in women with breast cancer-related lymphoedema. *Eur J Cancer Care.* **11**(4): 254-261.

Meric F, Buchholz TA, Mirza NQ, Vlastos G, Ames FC and Ross MI, (2002). Long-term complications associated with breast-conservation surgery and radiotherapy. *Ann Surg Oncol.* **9**(6): 543-549.

Passik SD and McDonald MV. (1998). Psychological aspects of upper extremity lymphoedema in women treated for breastcarcinoma. *Cancer.* **83**: 2817-2820.

Clark B, Sitzia J and Harlow W. (2005). Incidence and risk of arm oedema following treatment for breast cancer: a three-year follow-up study. *Qjm.* **98**(5): p. 343.

Lacovara J and Yoder L. (2006). Secondary lymphedema in the cancer patient. *Medsurg Nurs.* **15**(5): 302.

Armer J and Stewart B. (2005). A comparison of four diagnostic criteria for lymphedema in a post-breast cancer population. *Lymphat Res Biol.* **3**(4): 208-217.

Lucci A, McCall LM, Beitsch PD, Whitworth PW, Reintgen DS and Blumencranz PW. (2007). Surgical complications associated with sentinel lymph node dissection (SLND) plus axillary lymph node dissection compared with SLND alone in the American College of Surgeons Oncology Group Trial Z0011. *J Clin Oncol.* **25**(24): 3657.

Williams A, Franks P and Moffatt C. (2005). Lymphoedema: estimating the size of the problem. *Palliat Med.* **19**(4): 300.

Holcomb S., (2006). Identification and treatment of different types of lymphedema. *Adv Skin Wound Care.* **19**(2): 103.

Edwards, T. (2000). Prevalence and aetiology of lymphoedema after breast cancer treatment in southern Tasmania. *Aust N Z J Surg.* **70**(6): 412-418.

Koul R, Tarek D, Cathrine Russel, Guenther W and Nugent Z. (2007). Efficacy if complete Decongestive therapy and manual lymphatic drainage on treatment -related lymphedema in breast cancer. *J Radi Oncol Bio Phy.* **67**(3): 84-86.

Kearney N and Richardson A. (2006). Nursing patients with cancer: principles and practice, ed. *Churchill Livingstone.* **14**: 19-25.

Marrs J. (2007). Lymphedema and implications for oncology nursing practice. *Clin J Oncol Nurs*. **11**(1): 19-21.

Badger C, Preston N, Seers K and Mortimor P. (2004). Physical therapies for reducing and controling lymphedema of the limbs. *The Coherence Database of Systematic Reviews.* **18**(4): 141.

Courneya KS, Mackey JR and McKenzie DC. (2002). Exercise for breast cancer survivors: research evidence and clinical guidelines. *Phys Sportsmed.* **30**(8): 3342.

Kilbreth SH and Refshauge K. (2006). Resistance and Stretching Shoulder Exercise Early Following Auxiliary Surgery for Breast Cancer, *Rehabilitation Oncology*. **24**(2): 9-14.

Turner J, Hayes S and Hirche H. (2006). Improving the Physical Status and Quality of Life in Women treated for Breast Cancer. *J surgical oncology.* **84**: 141-146.

Gregory G and Koldman Y. (2006). Effect of Exercise on Breast Cancer Patient and Survivors, *Psycho-oncology*. **11**: 447-456.

Fong SS, Ng SS, Luk WS, Chung JW, Ho JS, Ying M and Ma AW. (2014). Effects of qigong exercise on upper limb lymphedema and blood flow in survivors of breast cancer: a pilot study. *Integr Cancer Ther.* **13**(1): 5461.

Johansson K, Hayes S, Speck RM and Schmitz KH. (2013). Waterbased exercise for patients with chronic arm lymphedema: a randomized controlled pilot trial. *Am J Phys Med Rehabil*. **92**(4): 3129.

Wozniewski M, Jasinski R and Plich U. (2001). Complex Physical Therapy for Lymphoedema of the Limbs. *Physiotherapy.* **87**(5): 252-254.