ORIGINAL ARTICLE

Recieved: April 2016
Accepted: July 2016

The effect of Combined Decongestive Therapy and Pneumatic Compression Pump on Body Image in Patients with Lymphedema Secondary to Breast Cancer Treatment

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BCCR
2016; 8(1&2): 18- 27
www.bccrjournal.com

ABSTRACT

Background: Lymphedema is a common complication for breast cancer therapy. Patients with lymphedema may experience pain and body image issues. This study investigates the effect of Combined Decongestive Therapy and pneumatic compression pump on body image in patients with lymphedema secondary to breast cancer treatment.

Methods: Fourty-two women with breast cancer-related lymphedema participated in this study. All patients completed the Body Image and Relationships Scale. Researchers divided the participants randomly into either an intervention (n=21) or a control group (n=21). A certified nurse worked on Combined Decongestive Therapy in the intervention group in two phases. In the first phase, CDT was accompanied with compression pump for four weeks, three days per week. In the second phase, CDT was performed daily without compression pump for four weeks by patients at home. At the end of each phase, both groups completed the questionnaire. Researchers analyzed the data using SPSS 17.

Results: The total score of the Body Image and Relationships Scale increased insignificantly in the intervention group and significantly in the control group. In this regard, both groups had statistically significant differences at different phases of study. Gaining a higher score in this questionnaire indicates a weaker body image.

Conclusion: Although combined decongestive therapy techniques did not improve body image in the intervention group, there is hope for treatment of lymphedema in this group to prevent deterioration in body image over time. In the control group who were not treated, body image became weaker over the time.

Keywords: Lymphedema, Breast cancer, Body image, Nurse, Iran

Introduction

From 10 to 49% of patients who have been treated for breast cancer are at risk for lymphedema[1].Secondary or acquired lymphedema can be associated with cancer, infection, radiation, surgery, or trauma[2]. Lymphedema is associated with psychological and functional influences and adversely influences the quality of life[3]. Researchers have recently suggested that breast cancer treatments have dramatic impacts on patients' body image. Such impacts result in adverse effects on sexual function, psychosocial judgment, and quality of life in patients. Body image is an important predictor for the psychological consequences of breast cancer[4]. Breast cancer treatment-related lymphedema results in performance and function concerns, physical inactivity, lack of self-confidence in social and recreational activities, social anxiety, avoidance, and in performing self-care; there are sexuality concerns for both patients with lymphedema and for their partners who may either be uncomfortable with the appearance of the limb or fear hurting the patients during sexual activity[5]. Unfortunately, there is no cure for this condition[6]. Combined Decongestive Therapy (CDT) was identified by Winnie Varter in late 1800 for the first time and then was amended by Vodder in 1930[7]. In this method, the pressure of bandage, manual lymphatic drainage, and exercises that increase the flow of lymph and skin care are used[1,2]. Intermittent pneumatic pump or pressure therapy is not a part of CDT, but it can be used as an adjunct method. This device is air-filled and emptied using a specific program. The device leads the lymphatic fluid from distal to the proximal part of extremities and then to the trunk[1,8,9]. This study investigates the effect of combined decongestive therapy (CDT) and pneumatic compression pump on body image in patients with lymphedema secondary to breast cancer treatment.

Methods

This single blind randomized clinical trial involved women referred to a therapeutic center between October 2009 and December 2009.

Initially, 42 patients who met the inclusion criteria agreed to participate and provided their written informed consent.

The inclusion criteria were a diagnosis of breast cancer, history of surgery, chemotherapy and in some cases hormone replacement therapy and radiotherapy, a diagnosis of lymphedema based on assessment by a specialist, mild to sever degree of lymphedema, passing of at least one year since axillary node dissection, unfamiliarity of the patient and her family with CDT, telephone access, and an age range of 35 to 70 . Before the intervention, all patients completed the Body Image and Relationships Scale (BIRS); then, they were divided randomly into intervention and control groups. There were no significant differences between the two groups in the number of positive lymph nodes ($P<0.4$), degree of lymphedema ($P=0.5$), side of the limb involved ($P=0.5$) or history of radiotherapy ($P=0.5$) and hormone replacement therapy ($P=1.0$) (Table 1).

Body image was evaluated with BIRS. This scale is a questionnaire that consists of 32 items in three subscales or factors, named strength and health, social barriers, and appearance and sexuality. Higher scores on each subscale indicated greater impairment. Factor 1, strength and health, assessed perceived physical impairment related to treatment, including decreased energy, feeling «weak» and «unhealthy», and lack of subjective control over health and strength. Twelve items loaded onto factor 1, for a maximum score of 60. Factor 2, social barriers, included nine items assessing perceived impairment in social interactions, including reduced social activity due to embarrassment related to physical or psychological symptoms, for a maximum score of 45. Finally, 11 items assessing

Table 1. Comparison of the two groups			
Intervention group n=21		Control group n=2 1	P-value
Lymph node removed (number) mean±SD	3.28±3.6	4.9± 7.59	0.4
Degree of lymphedema Degree 1 Degree 2 Degree 3	 0 (0%) 10 (47.6%) 11(52.4%)	 1 (4.8%) 11 (52.4%) 9 (42.9%)	0.5
Affected arm Dominant Non-dominant Affected arm	 11 (52.4%) 10 (47.6%)	 13 (61.9%) 8 (38.1%)	0.5
Treatments HRT RT CT	 17 (81%) 20 (95.2%) 21 (100%)	 17 (81%) 19 (90.5%) 21 (100%)	 1.0 0.5 1.0

HRT= Hormone-replacement therapy, RT= Radiotherapy, CT= Chemotherapy.

decreased enjoyment and satisfaction of sexual activity, physical appearance embarrassment, and distorted perception of one's body as "whole" and "natural" loaded onto factor 3, appearance and sexuality, for a maximum score of 55. Each item was scored on a five-point Likert scale (from 1 = strongly disagree, to 5 = strongly agree). Thus, the minimum score of each item was 1 and the maximum score was 5. The total score was calculated by summing the responses for all items. The scoring of individual items was reversed where appropriate. Therefore, higher scores indicated more impairment. Items 2, 4, 7, 8, 9, 12, and 27were related to health and strength factor, and item 1, 3, 5, 16, 19, 30, 31, and 32 to the appearance and sexuality factor As a result, if a patient answered "strongly agree" her score would be 1, and if she answered "strongly disagree" her score would be 5. Total score of this questionnaire is 160. Based on Hormes et al. (2008)[5], test-retest reliability and internal consistency of this questionnaire are satisfactory and this questionnaire have good discriminant validity. In the present study, for examining the validity of this questionnaire, at first the English version was translated to Persian and then the Persian version was approved by professors who had expertise in this area. Necessary amendments were made in accordance with professional views. Furthermore, the Persian translation was translated to English by a person fluent in both Persian and English; the translation was not much different from the original English version. To check the reliability of this questionnaire, test-retest reliability was measured. For this purpose, 30 patients (who had the inclusion criteria) completed the questionnaire and, after two weeks, completed it once more. The correlation coefficient for two administrations of the questionnaire was calculated as $r = 0.76$.

Patients in the intervention group received treatment with CDT and compression pumping. Patients in the control group received no treatment for lymphedema, but were placed on the waiting list for CDT as soon as possible after the eight-week follow-up period. The first phase (therapeutic phase) of CDT was conducted at the clinic where compression pumping

was also used to treat lymphedema. Each patient received three weekly sessions in four weeks, and each session lasted 60-90 minutes. In each session, an educated nurse first performed MLD for 30-40 minutes and then the affected upper limb was placed in the compression pump for 15 minutes. After that, the affected limb was bandaged with multilayer compression bandages and remedial exercises were performed to increase the lymph circulation. During these sessions, written and verbal information was provided regarding skin and nail care, bandage care, and practical training in MLD. In addition, patients were informed how to bandage the upper limb and perform remedial exercises. They were also prepared for the second phase (maintenance phase), which consisted of long-term self-care to maintain the limb size. The patients were asked to perform these techniques by themselves during sessions in the second half of the first phase (third to fourth weeks). During the maintenance phase, patients performed CDT daily at home for a period of four weeks. They were given a telephone number to contact for help at any time. During the maintenance phase, each patient was contacted weekly via telephone by one of researchers to ask whether they needed any help with their self-care. Each patient completed a daily self-care checklist. The use of the checklist was verified during the weekly telephone contact. At the end of each phase (four and eight weeks after starting the intervention), patients completed the BIRS. The authors were committed to the ethical principles of informed consent, permission to record the interview, voluntary participation, confidentiality of the data, and anonymity.

Statistics

The data were analyzed with analytical and descriptive statistics in SPSS 17.0. Descriptive statistics included absolute and percentage frequencies, means, and standard deviations. Analytical statistics included independent-samples t-test and chi-squared test. Mean values of data at three phases (before intervention, four and eight weeks after the intervention) in the two groups were compared in a repeated measurement design.

Results

A total of 42 women with breast cancer-related lymphedema met our inclusion criteria. The age range was 70-35 years, and the mean age was 51.61 years (SD: 9.28). Characteristics of the patients in the two groups are presented in Table 2.

Body Image and Relationships Scale (BIRS):

In the intervention group, the mean score related to the health and strength factor, before and after intervention (four and eight weeks later) did not show any significant statistical difference (P=0.07). In the control group, the mean score of this factor at different phases of study had a significant increase statistically (P<0.04). The mean variations of the health and strength factor showed a significant different between the control and intervention groups (P<0.04). In fact, the temporal changes of the factor scores in these two groups were different. This difference was visible four weeks after the intervention (P<0.02).

In the intervention group, mean score of the social barriers factor at different phases of study slightly increased. This increase was not statistically significant (P=0.16). Moreover, in the control group, the mean score of the social barriers factor before and after intervention (four and eight weeks) slightly increased, which was not statistically significant (P=0.16). However, the mean variation of this factor did not have any significant statistical difference between the intervention and control groups (P=0.08). In other words, the temporal changes of the factor scores in the two groups were not different.

Table 2. Characteristics of the patients		
	Intervention group n=21	Control group n=21
Age (years)		
Mean±SD	50.38±9.92	52.85±8.66
Range	35-70	35-70
Educational level		
Illiterate	1 (4.8%)	6 (28.6%)
Early primary education	0 (0%)	6 (28.6%)
Late primary education (from 12 to 14 years)	3 (14.3%)	2 (9.5%)
Secondary education	10 (47.6%)	6 (28.6%)
University education	7 (33.3%)	1 (4.8%)
Marital status		
Single	1 (4.8%)	1 (4.8%)
Married	20 (95.2%)	20 (95.2%)
Type of operation (%)		
Breast-preserving procedures	9 (42.9%)	5 (23.8%)
Modified radical mastectomy	8 (38.1%)	13 (61.9%)
Radical mastectomy	4 (19%)	3 (14.3%)

In the intervention group, mean score of the appearance and sexuality factor at different phases of the study was not significantly different statistically (P=0.3). However, in the control group, the mean score of this factor before and after intervention (four and eight weeks) had a significant statistical increase (P<0.05). Also, the mean score of this factor showed a significant difference in the control and intervention groups (P<0.01). In fact, the temporal changes of the factor scores in these two groups were different.

In the intervention group, the mean total score of the questionnaire at different phases of the study poorly increased, which was not statistically significant (P=0.4). However, in the control group, the mean total score of the questionnaire before and after intervention (four and eight weeks) significantly increased (P<0.02). The mean change in total score of the questionnaire between the two groups showed a significant statistical difference (P<0.01); that is, the temporal changes in the total score of the questionnaire were different between the two groups (Table 3).

Discussion

Upper extremity lymphedema is the most significant long-term complication of breast cancer treatment. It causes upper extremity function loss, which has a direct impact on the patient's quality of life[10]. CDT techniques are a protective treatment for lymphedema. However, the relative efficiency of each component of this comprehensive treatment has not been studied recently in randomized control trials[2]. The goals of lymphedema treatment are as follow: to reduce swelling, increase joints' motion of the affected limb, and reduce the patient's discomfort[11].

In the intervention group, the lack of significance of health and strength at different phases of the study can be explained by before-intervention feelings of malformation, heaviness, pain, premature fatigue, and loss of motion of the shoulder joint. Such "body image and relationships" perceptions have adverse effects on patients. Four and eight weeks after the intervention, the existence of several heavy layers of bandages on the upper affected limb that

bandages on the upper affected limb that was difficult to cover by clothing resulted in no improvement for patient's body image during the treatment. Wearing bandages, sleeves or compression stockings for treating lymphedema is a reminder of breast cancer and can cause psychological distress. However, successful physical treatment of lymphedema can reduce chronic swelling and psychological distress, and can help improve the quality of life[12].

Table 3. Comparison of the intervention and control groups in terms of mean scores of the Body Image and Relationships Scale at different phases of the study

Body Image and Relationships Scale	Phases of study	Intervention Group		Control Group		Comparison of the two groups at different phases of study P-value
		Mean+ SD	Changes at different phases of study P-value	Mean+ SD	Changes at different phases of study P-value	
Health and Strength	Before the intervention	26.09±6.78	0.07	28.47±7.76	<0.04	<0.04
	weeks 4 after intervention	28.04±5.67		33.61±8.48		
	weeks 8 after intervention	29.19±6.43		32.66±8.95		
Social Barriers	Before the intervention	19.71±7.10	0.16	24.71±9.41	0.16	<0.08
	weeks 4 after intervention	22.04±7.47		26.04±10.02		
	weeks 8 after intervention	23.00±7.42		26.66±9.06		
Appearance And Sexuality	Before the intervention	28.42±7.45	0.3	29.95±7.85	<0.05	<0.01
	weeks 4 after intervention	26.52±6.60		33.47±9.98		
	weeks 8 after intervention	26.38±7.79		34.90±8.46		
Total Score	Before the intervention	74.00±18.23	0.4	84.19±20.03	<0.02	<0.01
	weeks 4 after intervention	76.61±15.32		93.19±22.50		
	weeks 8 after intervention	78.57±17.67		94.23±18.93		

In the control group, the significant increase in the score of health and strength factor can be associated with lymphedema and its complications at different phases of the study. It is shown that women with lymphedema are more prone to mental disorders and functional disability. Because of psychological disorders secondary to lymphedema, these psychological problems should be identified as soon as possible.8 Nevertheless, prevention and treatment of body image problems have been ignored in studies related to body image issues caused by physical illnesses[13].

In the intervention group, mean scores of social barriers factor at different phases of study was not statistically significant, and this result was related to before- and after-intervention problems. Before the intervention, the feeling of embarrassment and discomfort discourages the patients from engaging in their favorite activities. Four and eight weeks after the intervention, although patients have been treated, the social interactions of patients does not show any significant statistical difference compared to before the intervention, due to the existence of bandages, accomplishment of daily exercises, manual lymphatic drainage by patients at home. A review study reported that existence of bandages could reduce social activities in most women[14].

In the control group, the cause of non-significant difference in this factor's scores may be related to lymphedema and social limits caused by this complication. Health experts suggest that there are high levels of distress, depression, and social isolation in a significant number of patients affected with lymphedema. Almost 10%of women with lymphedema who receive treatment in rehabilitation clinics are referred to psychiatrists for consultation. The main reasons for the referral of these patients are depression, anxiety, and sexual and social problems. It is difficult to hide a swollen hand; this disorder can be painful and can lead to performance reduction and lack of motor coordination. It needs treatment otherwise; it can limit the patient's social activities[12].

In the intervention group, mean score of the appearance and sexuality factor at different phases of study decreased slightly, which is not statistically significant. However, this reduction is important from the psychological standpoint, and may help patients receive longer treatments for lymphedema and improve their appearance and sexual self-perception. As in this study, implementation of CDT techniques causes a slight improvement (not a statistically significant decrease) in the problems of appearance and sexuality. It is recommended that in the future, the impact of CDT techniques on body image of these patients be studied for a longer period of time.

In the control group, the cause of statistically significant increase in the mean score of the appearance and sexuality factor and the presence of further disturbance in this factor can be attributed to adverse effects of the treatments of breast cancer and lymphedema on natural feelings and completeness of the individuals. Embarrassment and problems related to sexual activities are examples of such feelings. Recent studies have shown that many cancer patients express difficulty hiding their failure to resume normal sexual activities, and this is especially true for patients with breast cancer. Behavioral techniques are important aspects of sexual dysfunction treatment. Receiving help from a therapist who has experience working with cancer patients can be effective in this case[14].

Generally, in the intervention group, the cause of non-significant changes in the total score and

subscales of this questionnaire can be attributed to the small sample size. As mentioned before, the changes in the intervention group were not significant at any phase of the study; however, in the control group, the scores of health and strength and appearance and sexuality factors were statistically significant. The sample size in this study was based on the estimated mean percentage volume reduction of the upper limb[15].

On the other hand, the mean changes in the total score of the questionnaire were significantly different between the control and intervention groups . In fact, temporal changes of this score were different between the two groups.

There was no change observed in the score of the intervention group in different phases of study. But in the control group, this score significantly increased over time. Significant differences were visible between the two groups in the total score of the questionnaire related to changes in the health and strength and appearance and sexuality factors. Thus, the hypothesis of this study, i.e. whether implementing CDT with compression pump improves intervention group patients' body image and relationships as compared with the control group, is rejected.

Women with lymphedema experience problems such as weight gain and deformities in the affected limb. The heaviness and large size of the arm limits its physical activities fundamentally. Women who face this complication may experience difficulty in performing their job duties. It is also possible that they become unable to carry out their family responsibilities. In severe cases, patients may need help to accomplish their daily activities. The large size of the arm makes it difficult for them to wear their normal clothes. Lymphedema, especially if untreated, can cause severe impairment in quality of life. Associated problems are psychological distress, depression, social isolation, and sexual concerns. Tobin et al. found that patients with lymphedema have more anxiety and depression, and adjustment problems with family, work, community, and sex. Furthermore, in a study conducted by Passik et al., physical, sexual, and psychological problems were reported in these patients.

A review article has reported the presence of pain, lack of social support and consistency, and affected dominant arm as markers for greater functional impairment[14]. Women who suffer from lymphedema as a delayed complication of the treatment often report that this disorder gradually destroys them, because after they get used to the absence of breast, lymphedema appears and becomes a new problem for patients. Breast surgery malformation is not visible except in intimate situations, and in many cases patients can use plastic surgery to hide such deformities. Deformities of the arm lymphedema and especially those of the hand are visible and, therefore, can create a source of social anxiety. Later presence of lymphedema becomes a second cause of self-concept and gender identity distortion, which can complicate the patient's psychological problems. Psychological problems that we encounter in lymphedema clinics can be multidimensional. These problems need professional interventions to recognize disease-related complexities. Psychological, pharmacological, individual, or group therapy and treatments can be of great help for patients[12].

The results of a study conducted by Speck et al. at 2010 showed that continuous exercise twice a week can have a positive impact on appearance, health, physical strength, sexuality, communication, and social perceptions and performances of patients[16]. Although the design of the mentioned study is different from this study, both studies assess the effect of rehabilitation programs on body image and relationships in patients with a history of breast cancer.

It is noteworthy that body image improvement takes time and is influenced by several factors. Body image depends on many factors and cannot be changed in a short period of eight weeks, especially in patients who have lost all or part of their breast and are also affected by lymphedema. Body image improvement requires counseling sessions and physiological support over a long period of time. As in Speck et al. (2010), changes in scores of BIRS appeared after a year.

In the study conducted by Poorkeiani et al. (2010), implementation of medical care along with a rehabilitation program that consists of psychological counseling sessions lead to improvement in the quality of life and body image in breast cancer survivors after three months[17]. Counseling interventions targeting body image dissatisfaction can be potentially helpful for patients with lymphedema18. Therefore, researchers suggest that a similar study should be conducted with the help of psychological counseling sessions in the future.

Conclusions

Although Combined Decongestive Therapy techniques did not improve body image in the intervention group, there is hope for treatment of lymphedema in this group to prevent deterioration in body image over time. In the control group who were not treated, body image became weaker over the time.

Acknowledgement

Authors are grateful to the staff of Shiraz University of Medical Sciences for their financial and material support. We would like to thank abdol-Rasoul Talei and Zeinab Zakeri for their assistance in teaching CDT techniques at the Breast Clinic of Shahid Motahhari Therapeutic Center in Shiraz (southwest of Iran). We also thank sedigheh Tahmasebi for her help in diagnosing the degree of lymphedema, and thank Hamid Reza Tabatabaee for his assistance in statistical analyses. This study was registered at the Clinical Trial Registry with the registry number of NCT02650297.

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