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Complex decongestive therapy and taping for patients with postmastectomy lymphedema: A randomized controlled study

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A B S T R A C T

Purpose: The purpose of our study was to investigate the effects of Kinesio Taping® Application with Complex Decongestive Therapy (CDT) in patients with lymphedema.
Materials and Methods: 45 patients were randomly divided into 3 groups (CDT including Bandage, CDT including Bandage + Kinesio Tape®, CDT including Kinesio Tape® without bandage). Assessments included the severity of the symptoms such as pain, discomfort, heaviness, tension, stiffness and weakness. Bilateral circumference measurements were done for evaluation of the edema.
Results: Symptoms were decreased in all three groups ($p < 0.05$). CDT was found effective only during treatment in arm volume ($p < 0.05$). Kinesio Taping® applied with CDT had effect of decreasing edema after 10 days of treatment period ($p < 0.05$) and for control period ($p < 0.05$). Only the application of Kinesio Taping® group also had significant decrease at edema ($p < 0.05$).
Conclusion: Kinesio Taping® Application along with CDT may have a better effect on decreasing lymphedema which can stimulate the reduction of edema for long term effects.

Introduction

Lymphedema is a swelling of the soft tissues that results from the accumulation of protein-rich fluid in the extracellular spaces. It caused by decreased lymphatic transport capacity and/or increased lymphatic load (International Society of Lymphology (2009)).

Upper extremity lymphedema occurred after mastectomy is a common complication of breast cancer treatment. Both surgery and/or radiotherapy, involving lymph drainage routes of the breast and axillary areas, are implicated in the development of upper extremity lymphedema (Tsai et al., 2009; Ware and Sherbourne, 1992; Willams, 2006). Lymphedema results in swelling of the arm, hand, and trunk which can lead to limb pain, heaviness, and altered sensation. These symptoms can result in functional limitations of the affected limb and psychosocial distress can arise secondary to both symptoms and poor limb cosmesis (Kim et al., 2010).

Complex Decongestive Therapy (CDT) or Decongestive Lymphatic Therapy is a common management for lymphedema. A program combining skin care, manual lymphatic drainage, exercise, and compression therapy (multilayer bandage or garment) is recognized as the best practice in lymphedema management (Kim et al., 2010; Lasinski, 2013; Liao et al., 2012).

Manuel Lymphatic Drainage (MLD) is a major component of CDT. Within the network of initial lymphatics in the dermis, lymph normally moves in various directions across the skin and down through pre-collector and collector vessels towards lymph nodes. MLD can be used to redirect lymph across the plexus of initial lymphatics towards healthy lymph nodes, often across the watershed areas between lymphatic territories of the skin and via the intercostal and parasternal lymphatics of the trunk. The initial lymphatics respond to the rhythmic movement of the skin under the therapist's hands, opening to allow fluid to enter the system. MLD also influences the contractile function of larger collector lymphatics, enhancing lymph flow and creating a suction effect that pulls lymph from distal areas toward the lymph nodes (Williams, 2006). Skin care is also an important component of CDT. Edematous areas should be kept clean, dry and moisturized with a

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suitable bland emollient. General advice should be given to patients on observing their skin (Williams, 2006).

Exercise is the other important component of the CDT. Lymph flow can be enhanced by activities such as walking, arterial pulsation, arteriolar vasomotion, intestinal peristalsis, muscle movement, exercise, massage or respiration. Exercise is a general provider of all enhancing activities (Shim et al., 2003) and exercises may facilitate venous and lymphatic flow (Hayes et al., 2009; Ya-Hui et al., 2012). Kim et al. (2010) stated that for the treatment of patients with breast cancer–related lymphedema, active resistive exercise with complex decongestive therapy did not cause additional swelling, and it significantly reduced proximal arm volume and helped improve quality of life (Kim et al., 2010).

Compression bandaging made with short stretch bandages is also one of the major components of CDT. King et al. (2012) reported that within the initial treatment phase of a CDT protocol for acquired, breast cancer-related lymphedema, compression bandaging may lead to greater volume reduction but worse upper extremity functional status (higher Disability of Arm and Shoulder Questionnaire scores) as compared to compression garments (King et al., 2012). A multilayer bandage can only be stretched a little and is usually used to maintain the volume reduction from manual lymphatic drainage by the help of exercise. It provides mild pressure during resting and creates higher pressure during muscle contraction to prevent skin extension. The lymphatics are compressed between the muscle and the bandage, causing them to be manually pumped. The variable pressure over the skin created by muscle contraction is identical to the effect obtained after a massage, which increases the lymph flow. The bandage should be kept on as long as possible, even during the night (Tsai et al., 2009).

In lymphedema management, Kinesio Taping® Lymphatic Correction Method is also used to assist the removal of edema by directing fluid towards a less congested lymphatic pathway and lymph node. This is accomplished by the lift effect and elasticity of Kinesio Taping® material. The lifting of superficial skin decreases pressure and opens initial lymphatics, while the tape also creates a massaging action during active motion. This effect is very important especially in patients with sensitive skin to pressure. The effect of Kinesio Taping® on muscle also improves the efficiency of the deeper lymphatics by allowing maximum contraction and relaxation of a muscle (Kase et al., 2003).

According to the literature there are lots of studies those investigating the effects of CDT in lympedema treatment (Shim et al., 2003; Szuba et al., 2000; Tsai et al., 2009; Ya-Hui et al., 2012) however there is no randomized controlled study compared the effects of CDT, CDT plus Kinesio Tape® and CDT without bandage (skin care + MLD + exercise) plus Kinesio Tape® in lympedema treatment after mastectomy.

Materials and methods

Research design

The study protocol was approved by the Hacettepe University Ethics Committee (HEK 12/227-16), and all participants provided written consent. 45 patients with grade 2 and 3 lymphedema were randomly divided into 3 groups. The CDT including MLD, compression bandage skin care and theurapeutic exercises were applied to the first group. In the second group, CDT was combined with Kinesio Taping® Lymphatic Correction Technique. This lymph technique was applied to the skin under the compression bandaging. In the third group CDT without bandaging was combined with and Kinesio Taping® Lymphatic Correction Technique. After 10 treatment sessions, compression garments were provided to all patients. Patients were also instructed to continue their exercises at home. All patients were assessed by an experienced physiotherapist and the treatments were done by another educated lymphedema therapist in order to provide single blind structure of the study.

The patients were randomly assigned to the one of the three groups using an online random allocation software program (GraphPad Software QuickCalcs, GraphPad Software Inc., La Jolla, California, USA).

Participants

Forty five patients who admitted to Başkent University Hospital, Ankara, Turkey with the complaints of edema, pain, limitations in daily living activities, discomfort, heaviness, tension, stiffness, numbness and were diagnosed with grade 2 and 3 lymphedema participated in the study. Participants were included if they had post-mastectomy upper extremity lymphedema. All participants had infiltrating ductal carcinoma as cancer type. None of the patients had limited shoulder range of motion. 45 patients were divided into 3 groups randomly but the groups did not show homogeneity according to the sociodemographic characteristics except Body Mass Index (BMI) and time since surgery. Time since surgery was between 6 and 8 years and statistically homogeny between groups ($p = 0.483$). All patients had received a pharmacologic treatment of Chemotherapy or Chemotherapy + Radiotherapy but had developed lymphedema in 6–8 years. Exclusion criteria for this study were if subject; a) had grade 1 or 4 lympedema, b) had cardiac and kidney problems, c) had an allergy to adhesive tape, d) had acute infection in any part of their body, e) had malign metastasis to any organs, f) orthopedic problems affecting upper extremity.

Assessments

Patients were assessed before, at the end of the treatment (10th day) and at control period (1 month after the end of treatment). Assessments included the severity of the lymphedema-related symptoms such as pain, limitations in daily living activities, discomfort, heaviness, tension, stiffness and numbness which were evaluated by Visual Analog Scale (VAS). VAS is a 10 cm line with no marks along them, anchored with the words “no pain” on one hand, and “the most severe pain” on the other. Participants were simply instructed to place a mark along the line at a level representing the intensity of their pain, discomfort, heaviness, tension, stiffness and numbness, limitations of daily living activities. Also patient satisfaction during night and daily living from the treatment, itching and wound formation caused by treatment were assessed with VAS at the end of treatment (Tsai et al., 2009).

For the evaluation of volume reduction, circumferential measurements in centimeters on bilateral upper extremities at 5 cm intervals from wrist to axilla were used. These circumference measurements were then used to calculate the volume of the arms with Frustum Formula (Kaulesar Sukul et al., 1993).

In addition, quality of life was evaluated by Short-Form 36 (SF-36). The SF-36, developed by Ware and Sherbourne (1992), consists of a multi-item scale which assesses eight health concepts each between 2 and 10 questions: physical functioning (PF), role limitations due to physical problems (RP), bodily pain (BP), general health perception (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and mental health (MH). Lower scores describe limitations in quality of life (Ware and Sherbourne, 1992).