Kinesio Tape Versus Compression Garment on Post Mastectomy Lymphedema

MAHA A. HASSAN, Ph.D.* and SAMAH M. ISMAIL, Ph.D.**
The Departments of Physical Therapy for Surgery* and Cardiovascular/Respiratory Disorder & Geriatrics**, Faculty of Physical Therapy, Cairo University

Abstract

Objective: Comparing the effect of kinesio tape versus compression garment on post mastectomy lymphedema.

Material and Methods: Thirty female patients with post-operative mastectomy lymphedema were enrolled in the study with age 40-50 years. They were assigned randomly into two equal groups in number; Group A (Kinesio tape group), they received standard physical therapy program in addition to kinesio tape. While Group B (Compression garment group), they received traditional physical therapy program in addition to compression garment. Both groups is seen 3 times a week for 4 weeks. Circumferential lymphedema and shoulder ROM (flexion and abduction) were investigated before and after the study.

Results: Findings of the study revealed a significant improvement of shoulder ROM in kinesiotape group more than compression garment group on post-operative mastectomy lymphedema but edema level improved in compression garment group more than kinesio tape group.

Conclusion: Usage of kinesio tape as a method of rehabilitation to improve post mastectomy complications in particular lymphedema and shoulder ROM in comparison to compression garment for these cases.

Key Words: Kinesio tape – Mastectomy – Lymphedema – Compression garment.

Introduction

BREAST cancer refers to a malignant tumor that has developed from cells in the breast. Risk factors of breast cancer may include gender (woman is the main risk factor for breast cancer), age, family history of the disease, inherited mutation of genes, overweight and heavy smoker or alcoholic [1].

Lymphedema is a side effect that can begin during or after breast cancer treatment. It isn't life threatening, but can last over a long period of time. Lymphedema involves swelling of the soft tissues of the arm or hand. The swelling may be accompanied by numbness, discomfort, and sometimes infection. Other complications followed the surgical treatment is loss of shoulder range of motion and severe pain [7].

A comprehensive rehabilitation program in physical therapy is beneficial to the breast cancer patient before and after surgery. An initial evaluation determines baseline shoulder function, circumferential limb measures, posture and flexibility, and fitness/activity level. The patient is instructed in post-surgical Range of Motion (ROM), resistive and aerobic exercises, lymphedema precautions, and guidelines for return to daily activities. Successful treatment for lymphedema, based on this pathophysiology, depends on the proper blend of treatment modalities which include manual lymphatic drainage, compression garments, and exercises [15].

A more recent advance to this program is the addition of kinesio taping. Kinesio taping works with the lymphatic system through:

- Skin: The tape can be applied on the skin in a manner that causes a massage-like skin movement that directs lymph away from an affected area. When placed over areas of fibrosis, the lifting act and increased movement of skin also assists in softening these tissues.

- Muscle: The motion of the tape, and its action on sensory receptors in the skin, can improve muscle contraction. Deeper lymphatic vessel function is enhanced by the nearby pumping action of muscle contraction and relaxation [10].

The aim of the study was to investigate and compare the effect of kinesio tape and compression garment on post mastectomy lymphedema and shoulder range of motion.
Material and Methods

Thirty female patients with post-operative mastectomy lymphedema were selected and recruited randomly from the Department of Surgery at the National Cancer Institute to participate in this study. They were free from any other pathological conditions or histories of other health abnormalities except arm lymphedema. The patients were excluded if they had recurrent malignancy, active infection, clinical evidence of obstructive venous disease, bilateral limb lymphedema, neurological and orthopedic problems, or diabetes. Their age ranged from 40-50 years. They were assigned randomly into two equal groups in number; Group A (Kinesio tape group) received physical therapy program in addition to kinesio tape. While Group B (compression garment group) they received physical therapy program in addition to compression garment. Patient education and advising is ongoing and includes exercise, edema prevention, skin and wound care for both groups. Both groups were seen 3 times/week for 4 weeks. Circumferential lymphoedema and shoulder ROM (flexion and abduction) were investigated before and after the study.

Ethical consideration:

The study protocol was explained in detail for each patient before the initial assessment and signed informed consent was obtained from each patient before enrollment in the study. The protocol of the study was approved from the ethical committee in Faculty of Physical Therapy, Cairo University before starting in the study.

Instrumentation:

A- Evaluation:

1- Goniometer: It was fabricated in plastic material. It is consisted of two plastic arms (stationary arm and movable or free arm) and fulcrum. It was used to measure ROM of shoulder joint (flexion-abduction) [9].

2- Plastic tape measurement: The plastic tape measurement (by centimeter) was used to measure the amount of lymphedema [18].

B- Therapeutic:

1- Kinesio tape: Kinesio tape (K-tape) for lymphatic drainage is a new choice in the field of physical therapy. K-tape had been designed to allow 30-40% longitudinal stretch. It is composed of 100% cotton fibers and acrylic heat sensitive glue (Kase et al., 2003). The tape is cut into a fan shape with several strips cut, leaving a shorter length of tape to act as an anchor washing the limb before application of tape [19].

2- Compression garments: Compression garments are pieces of clothing such as socks, pantyhose, sleeves that provide support that is especially useful for people who have to stand for long periods, or people with poor circulation. The garments can come in varying degrees of compression. Compression garments can also be used as a long-term treatment of arm lymphedema [6].

Procedures:

Evaluation procedures:

Each patient in both groups was asked to fill out the information sheet and signed a written consent for before restarting.

I- Shoulder ROM:

Shoulder ROM at the surgical side was measured as:

- Shoulder flexion measurement procedure, the patient lies in supine with hips and knees bent and lumbar spine flat. Arm is at the side with the palm in and the thumb up. The goniometer axis placed on the lateral aspect of the center of the humeral head, the stationary arm placed parallel to midaxillary line of the trunk and the moving arm placed parallel to longitudinal axis of the humerus pointing toward the lateral epicondyle [18].

- Shoulder abduction measurement procedures, the patient lies in sitting position and arm is in the anatomical position with the shoulder externally rotated. The goniometer axis placed on the posterior aspect of the shoulder just inferior and lateral to the coracoid process, stationary arm placed parallel to the trunk or perpendicular to the floor and the moving arm placed on posterior aspect of the upper arm parallel to longitudinal axis of the humerus [9].

II- Circumferential measurement of lymphedema:

From supine position, patient's hand rest on small pillow to suspend the arm, and circumference is measured by tape measurement at three sites: The first site, the upper boundary is 65% of the distance from the elbow (olecranon) to the shoulder tip (acromion). The 2nd site the midpoint of forearm Mid forearm point between the olecranon process of elbow and styloid process of wrist [18].

Treatment procedures:

I- Group A (Kinesio tape group): Patient is seen 3 times a week in the clinic. Treatment duration is typically 4 weeks. Patient washes extremity before treatment begins. Manual lymph drainage is for approximately 45 minutes. Kinesio tape is worn 23/24 hours a day, 7 days a week. Loca-
tions of Kinesio-tape: First site of Kinesio-tape on the upper arm: Starts from the anterior surface of the shoulder towards the elbow joint (e.g. the anchor of the Kinesio tape is located directly below the acromion process). Second site of Kinesio-tape on the upper arm: Starts on the posterior aspect of the shoulder joint complex towards the elbow joint (e.g. the first and second strips of the Kinesio tape intersect with each other on the lower third of the biceps muscle). Third site of Kinesio tape on the forearm: With the patient’s upper limb in the anatomical position the first strip of the Kinesio tape starts from the lateral epicondyle and towards the wrist joint (e.g. the anchor is on the lateral epicondyle). Fourth site of Kinesio tape on the wrist: With the patient’s upper limb in the anatomical position the second strip of the Kinesio tape starts from the medial epicondyle and towards the wrist joint (e.g. the anchor is on the medial epicondyle). Fifth site of Kinesio tape on the dorsal surface of the hand: The first strip starts from the wrist and towards the lateral side of the proximal interphalangeal joint and the second strip towards the medial side of the proximal interphalangeal joint. Kinesio tape is removed when patient arrives in clinic. Exercises start immediately followed by application of kinesio tape approximately one hour: Breathing exercises, shoulder mobility exercises and postural correction exercises [12].

II- Group B (pressure garment group): Manual lymphatic drainage is for approximately 45 minutes. Garment is worn 23/24 hours a day, 7 days a week. Garment is removed when patient arrives in clinic Exercises start immediately followed by application of garment approximately one hour: Breathing exercises, shoulder mobility exercises and Postural correction exercises. The period of pressure garment 4 weeks, must be change it (losses its elasticity) [3].

III- Both groups: Education is ongoing and includes exercise, edema prevention, skin and wound care [3].

Statistical analysis:
The data for subjects of both groups were analyzed by Paired t test within each group and Unpaired t-test to detect significance difference between groups. Values were reported as mean ± SD and significance was accepted at $p<.05$.

<table>
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<th>Item</th>
<th>Demographic data</th>
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<tbody>
<tr>
<td>Age (year)</td>
<td>Group (A) Group (B)</td>
<td>Group (A) Group (B)</td>
<td>Group (A) Group (B)</td>
</tr>
<tr>
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<td>83.93 81.86</td>
<td>168.13 167.26</td>
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<tr>
<td>$SD\pm$</td>
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<td>6.44± 4.7±</td>
<td>3.56± 5.92±</td>
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<td>98 88</td>
<td>173 178</td>
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<tr>
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<tr>
<td>Minimum value</td>
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<td>72 75</td>
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<td>$t$-value</td>
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<tr>
<td>Level of significance</td>
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<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
<th>$p$-value</th>
<th>% of improvement</th>
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</thead>
<tbody>
<tr>
<td>Shoulder flexion ROM:</td>
<td>Group A</td>
<td>76.51±2.85</td>
<td>134.27±1.12</td>
<td>0.000*</td>
<td>↑ 75.4%</td>
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<tr>
<td></td>
<td>Group B</td>
<td>76.08±3.76</td>
<td>92.01±4.87</td>
<td>0.000*</td>
<td>↑ 19.96%</td>
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<tr>
<td>Shoulder abduction ROM:</td>
<td>Group A</td>
<td>66.72±3.19</td>
<td>115.11±7.36</td>
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<td>↑ 72.52%</td>
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<td>Group B</td>
<td>68.28±3.01</td>
<td>100.48±4.35</td>
<td>0.000*</td>
<td>↑ 47.15%</td>
</tr>
<tr>
<td>Circumference at upper arm level:</td>
<td>Group A</td>
<td>32.11±1.29</td>
<td>26.31±1.23</td>
<td>0.000*</td>
<td>↓ 18.06%</td>
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<tr>
<td></td>
<td>Group B</td>
<td>33.19±1.43</td>
<td>29.19±3.05</td>
<td>0.000*</td>
<td>↓ 13.7%</td>
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<td>Circumference at forearm level:</td>
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<td>30.07±1.025</td>
<td>26.78±0.95</td>
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<td>↓ 12.28%</td>
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<tr>
<td></td>
<td>Group B</td>
<td>30.32±1.24</td>
<td>25.56±1.33</td>
<td>0.000*</td>
<td>↓ 18.62%</td>
</tr>
</tbody>
</table>

↑ : Increase. %: Percentage. ↓: Decrease. $p$-value: Probability level.
Results of patient demographic and clinical characteristics (age, weight and height) revealed no significant differences at the entry of the study between the two groups, represented in (Table 1).

I- Results of shoulder range of motion data:

ROM of Groups (A and B) represented in (Table 2) and shown in Figs. (1,2) showed that: For group A, the mean value of shoulder flexion pre treatment was (76.51±2.85) and post treatment was (134.27±4.12), paired t-test results showed significant difference of p-value was (0.000) and with percentage of improvement 75.4%. While for Group B the mean value of shoulder flexion pre treatment was (76.08±3.76) and post treatment was (92.01±4.87), with a significant difference of p-value was (0.000) and with percentage of improvement 19.6%.

For Group A, the mean value of shoulder abduction pre treatment was (66.72±3.19) and post treatment was (115.11±7.36), paired t-test results showed significant difference of p-value was (0.000) and with percentage of improvement 72.52%. While for Group B the mean value of shoulder abduction pre treatment was (68.28±3.01) and post treatment was (100.48±4.35), with a significant difference of p-value was (0.000) and with percentage of improvement 47.15%.

II- Circumference measurement data of upper limb:

- Circumference measure at upper arm level:

As shown in (Table 2) and Figs. (3,4) the mean value of circumference measure at upper arm level for Group A pre treatment was (32.11±1.29) and post treatment was (26.31±1.23), paired t-test results showed significant difference of p-value was (0.000) and with percentage of improvement was 18.06%, while the mean value of circumference measure at upper arm level for Group B pre treatment was (33.19±1.43) and post treatment was (29.19±3.05), paired t-test results showed significant difference of p-value was (0.000) and with percentage of improvement 13.7%.
Circumference measure at forearm level:

As shown in (Table 2) and Figs. (3,4) the mean value of circumference measure at forearm level for Group A pre treatment was (30.07±1025), and post treatment was (26.78±0.95), paired t-test results showed significant difference of p-value was (0.000) and with percentage of improvement was 12.28%, while the mean value of circumference measure at forearm level for Group B pre treatment was (30.32±1.24), and post treatment was (25.56±1.33), paired t-test results showed significant difference of p-value was (0.000) and with percentage of improvement 18.62%.

Discussion

The current study was designed to evaluate the therapeutic efficacy of kinesiotape on the reduction of the post mastectomy lymphedema.

Lymphedema as a complication resulting after breast cancersurgery is caused by the decreased tissue dispensability around joints and the increased weight of extremity [11].

Early symptoms of lymphedema include heaviness in the limb, numbness, tingling sensation and puffiness of the skin. Physical impairments, such as loss of shoulder range of motion and arm strength, have been found in breast cancer-treated women, as well as increased incidence of arm lymphedema [4].

Kinesio taping is used for the treatment of left upper extremity lymphedema after mastectomy and found that kinesiotaping effectively decreases disability in the treatment of lymphedema by creating alternative drainage pathways [11].

There was a study reported that the application of KT produces significantly faster reduction of the edema compared to standard lymphatic drainage in patients treated with the Ilizarov method [14].

There was a study concluded lymphatic applications of KT reduce lymph congestion in intercellular spaces and the reduction of lymphedema contributes to the mobility range improvement in all upper limb joints in patients with breast cancer related lymphedema [12].

The acceptance of K-tape was better than the application of bandage, because K-tape longer, with a greater ease of use, and increased comfort, and convenience in daily activities [12].

There was a study found that no evidence for the prophylactic role of compression garments in breast and trunk lymphoedema [8].

The results of the current study were recorded as an improvement of lymphedema formation in the post treatment in the result of kinesio tape plus standard physical therapy program (Group A) and pressure garment plus standard physical therapy program or CDT (Group B). According to the statistical results of this study showed a statistically improvement in upper extremity circumference in both groups of the study and consequently the kinesio taping plus standard P.T. program was the second choice of the treatment and the pressure garment plus standard P.T or CDT program came in the first choice.

The scientific explanation about why is kinesio tape effective on lymphedema a formation of post mastectomy cases. Are focoused on some scientific supports, this can be explained by the facts:

1- Kinesio tape creates alternative drainage pathways.

2- Kinesio tape reduces lymph congestion in intercellular space,

3- It facilitates lymph fluid flow.

Swedborg 1980 reported 3 to 4% decreases in the limb volume in the first 4 days after using pressure garment. While others reported a significant reduction of 14% and 30% respectively after using a combination of exercises and pressure garment in addition to traditional therapy [5].

In an open study that monitored a series of patients with post mastectomy lymphedema arm volume decreased by only 0.4% compared with the control arm over period of 4 weeks, with no treatment. After 6 months of using pressure garment there was an 8% reduction [2].

Contrast to the previous finding Szuba et al., 2002 recently described the progression of lymphedema in-group of patients who received traditional therapy (daily self care, massage) and compression garment. The patient had mean increase in limb volume of 32.7ml after one month of treatment and further increase of 35ml at six months [17].

The second main finding of the current study indicated considerable differences in the obtained data for shoulder range of motion pre and post treatment application in both groups of the study.

From the previous discussion of these results and according to reports of the researches in fields related to the present study, it could be concluded that both standard physical therapy program (CDT) and in addition to K.T have a significant improvement on lymphedema formation, ROM of shoulder
joint by reducing upper extremity circumference measurements (limb size) and decreasing pain intensity. Improving ROM of shoulder joint due to inhibition of neural receptors. Also, utilization of kinesio tape which is easily applied to these cases induced a greater improvement pain intensity and lymphedema formation than traditional physical therapy program.

References