International Journal of Physiotherapy and Research,
Int J Physiother Res 2017, Vol 5(5):2337-43. ISSN 2321-1822
DOI: https://dx.doi.org/10.16965/ijpr.2017.206

Original Research Article

COMPARISON OF KINESIOTAPING VERSUS LOW LEVEL LASER THERAPY FOR CARPAL TUNNEL SYNDROME IN POSTMASTECTOMY LYMPHEDEMA FOR POSTMENOPAUSAL WOMEN

Samah H. Nagib *[1], Rania N. karkousha [2], Gehan A. Aly [3].

*[1] Assistant professor of physical therapy Department for surgery-Faculty of physical therapy-Cairo University, Egypt.

[2] Lecturer of physical therapy department for Basic Science -Faculty of physical therapy-Cairo University, Egypt.

[3] Lecturer of physical therapy department for Obstetric and Gynecological diseases-Faculty of physical therapy-Cairo University, Egypt.

ABSTRACT

Background: Lymphedema is the most common complication of lymph node dissection for cancer treatment**.**

Purpose of the study: was to compare the effect of kinesiotaping versus low level laser therapy intervention in treating carpal tunnel syndrome in postmastectomy lymphedema for postmenopausal women.

Methods: Thirty females were recruited from the surgical department at National Cancer Institute, Cairo, Egypt, their mean ages 55.55± 2.350 years. They were randomized into two equal groups; both groups were received complex physiotherapy in addition to intermittent pneumatic compression at 50 mmHg as part of a congestive drainage treatment protocol three times per week for three months for lymphedema, also they were received strengthening and stretching exercises for wrist muscles and ligaments three times per week while group (A) received kinesio tape application for carpal tunnel syndrome and group (B) low level laser therapy, each patient received 24 treatment sessions at a rate of two sessions/week. Measurements were conducted before starting the treatment as a first record and at the end of treatment after three months as a second record for limb size, grip strength and Boston Questionnaire for carpal tunnel syndrome.

Results: Finding showed that there was significant differences pre and post treatment in both groups for limb size, grip strength and Boston Questionnaire scores while also there was no significant difference between both groups post treatment.

Conclusion: Both kinesiotaping and Low Level Laser Therapy are effective in treating carpal tunnel syndrome in postmastectomy lymphedema for postmenopausal women.

KEY WORDS: Lymphedema, kinesiotaping, Low Level Laser Therapy, postmenopausal women.

Address for correspondence: Dr. Samah H. Nagib**,** Assistant professor of physical therapy Department for surgery-Faculty of physical therapy-Cairo University, Egypt.
E-Mail: samahnagib@ymail.com

Access this Article online

Quick Response code

DOI: 10.16965/ijpr.2017.206

International Journal of Physiotherapy and Research
ISSN 2321- 1822
www.ijmhr.org/ijpr.html

Received: 26-07-2017	Accepted: 16-08-2017
Peer Review: 27-07-2017	Published (O): 11-09-2017
Revised: None	Published (P): 11-10-2017

INTRODUCTION

Lymphedema is the accumulation of protein rich fluid that happens when the ability of the lymphatic framework to transport interstitial fluid is exceeded, this affects around 140–200 million individuals overall [1]. Lymphedema occurs most commonly as a complication of lymph node dissection for cancer treatment,it

is estimated that as many as 30–50% of patients who experience lymph node dissection go on to develop lymphedema [2]. Postmastectomy lymphedema of varying degrees found in half of these patients was associated with brachial plexus entrapment and carpal tunnel syndrome (CTS), 28% of the patients had CTS [3, 4, 5]. CTS describes a constellation of hand symptoms because of median nerve entrapment at the wrist characterized physiologically by evidence of increased pressure inside the carpal tunnel and diminished nerve function at that level.[6].

Previous study have analyzed manual lymphatic drainage for lymphedema following breast cancer treatment and they found that it is safe and may offer extra benefit to compression bandaging for swelling diminishment [7], another examination have examined administration of low level laser treatment (LLLT) in women with breast cancer related lymphedema and they concluded that LLLT with bandaging may offer an efficient helpful choice to conventional manual lymphatic drainage [8]. Additionally another study has assessed the impacts of intermittent pneumatic compression (IPC) alone or in combination with exercises, it was concluded that IPC is a powerful method of decreasing upper limb edema in postmastectomy women [9].

Concerning treatment of CTS, a study was designed to compare the efficacy of ultrasound and laser treatment for CTS and it was concluded that ultrasound treatment was more effective than laser for treatment of this disorder [10], another investigation have explored the efficiency of extracorporeal shock wave therapy (ESWT) for treating patients with CTS and the outcomes demonstrated that ESWT is a significant and novel procedure for patients with CTS [11]. However, there is a gap in the literature concerning the effect of different physical therapy modalities for treatment of CTS in postmastectomy lymphedema for postmenposal women. The purpose of this study was to compare the effect of kinesiotaping (KT) versus LLLT intervention in treating CTS in postmastectomy lymphedema for postmenopausal women.

MATERIALS AND METHODS

Subjects: Thirty females (mean ages 55.55+2.350 years old) were recruited from the surgical depart-ment at National Cancer Institute, Cairo, Egypt. All patients had been undergoing unilateral breast cancer surgeries. Subjects who fulfilled the following criteria were eligible for enrollment in the study; (1) unilateral right postmastectomy Lymphedema, (2) mild to moderate lymphedema defined as a volume difference of 200-750ml between the upper limbs [12]. (3) All patients had symptoms of carpal tunnel syndrome in night time with disturbed sleep. Most common symptom was pain in the hand followed by tingling, which in turn was followed by weakness. All patients had a positive Phalen sign [13].

All patients signed an informed consent before participation in the study. Patients were excluded if they had (1) local recurrent or distant metastases, cellulites, chronic inflammatory diseases, (2) medication that influences body fluid and electrolyte balance, (3) other causes of carpal tunnel syndrome rather than postmastectomy lymphedema.

They were randomized (by odd number selection method) into two equal groups; group (A) was received complex physiotherapy in addition to IPC at 50 mmHg as part of a congestive drainage treatment protocol three times per week for three months for lymphedema, also this group received strengthening and stretching exercises for wrist muscles and ligaments three times per week and KT application for CTS while group (B) was received complex physiotherapy in addition to IPC at 50 mmHg as part of a congestive drainage treatment protocol for lymphedema, also this group received strengthening and stretching exercises for wrist muscles and ligaments and LLLT for CTS ,each patient received 24 treatment sessions at a rate of two sessions/week.

Assessments were done before starting the treatment as a first record and at the end of treatment after three months as a second record.

Measurement procedures

Limb size circumference assessment: Arm volume was calculated based on the formula for a truncated cone. Each measurement was repeated three times, and the average has been calculated [14,15].

$$V=h(C_1^2+C_1C_2+C_2^2)/12\pi$$

Where V is the volume of the segment, C1 and C2 are the circumferences at the ends of the segment, and h is the distance between them (segment length), π=3.1416.

The lymphedema volume was determined by comparing the difference in the arm volume between the affected and unaffected arms.

Grip strength assessment: A calibrated dynamometer was used to assess hand grip strength with response values in kilogram- (kg). Women were comfortably seated on a chair without armrests. The shoulder was addictive and neutrally rotated, with the elbow at a 90^0 flexion, and the forearm and wrist in a neutral position. Women were instructed to grip the dynamometer with maximum strength in response to a voice command and after returning to neutral condition. Three trials were performed on each side, alternately, with a rest period of at least one minute between trials of the same hand. The highest value of each side was used to represent the handgrip strength [16,17, 18].

Boston Questionnaire: It is a self-administered questionnaire**,** assesses the severity of symptoms and functional status in patients with CTS. The symptom severity scale (SSS) assesses the symptoms with respect to severity, frequency, time and type. The scale consists of 11 questions with multiple-choice responses, scored from 1 point (mildest) to 5 points (most severe). The overall symptom severity score is calculated as the mean of the scores for the eleven individual items. The functional status scale (FSS) assesses the affect of the CTS on daily living. The scale consists of 8 questions with multiple choice responses, scored from 1 point (no difficulty with the activity) to 5 points (can not perform the activity at all). The overall score for functional status was calculated as the mean of all eight. Thus, a higher symptom severity or functional status score indicates worse symptoms or dysfunction [19].

Treatment procedures

Complex physical therapy and intermittent pneumatic compression therapy:

Education about post mastectomy lymphedema and the home-based exercise program was given before the initiation of the exercise program. All patients in the study had decongestive physical therapy program to decrease edema, including: Manual lymphatic drainage, skin and nail care, Exercises in form of: Pumping exercises for hand and Range of motion exercises for shoulder joint. All patients were followed a three months treatment, three sessions per week for 60:90 min. All patients were received the decongestive physical therapy program in addition to 30 minutes IPC therapy and were treated 3 sessions per week for three month , the total session time was about 2 hours [20, 21].

Kinesotaping: For group A, KT for CTS was applied. It should be changed every week and applied for three months [22].

Low Level Laser Therapy (LLLT): For group B, Helium Neon (He–Ne) laser (632.8 nm, Level Laser M 300) in continuous wave (CW) mode with minimum power of 12 mw has been used. The X–Y dimensions of the area to be treated were measured also the distance between laser head and area to be treated (height) should be accurately fixed at 30 cm. The area to be treated extends from the proximal palmar crease to the distal wrist crease and laterally from the scaphoid tuberosity to the pisiform bone, it was exposed to LLLT through a sweeping computerized scanning at an angle of 30±15°. According to the prestored program for CTS, the instrument will automatically deliver 3 J/cm2 at an automatically measured therapy time, each patient received 16 treatment sessions at a rate of two sessions/week[23].

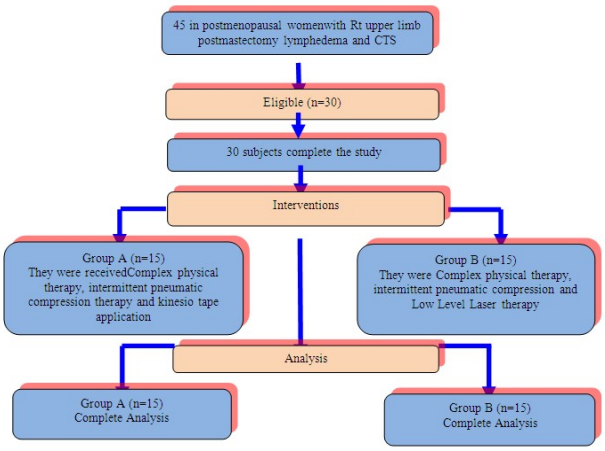
Statistical procedures: Statistical analysis of the data was carried out using The statistical package for social science (SPSS) (version 16; SPSS Chicago, USA). Unpaired t-test was used to compare the sample's age and BMI between the two groups, the same test was also used to compare between the two groups pretreatment and post treatment in limb size circumference and grip strength while paired t-test was used to compare between pretreatment and post treatment for each group in limb size circumference, grip strength and Boston questionnaire. The significance level was set at P-value less than 0.05.

RESULTS

A total of 45 patients were screened for eligibility, and 30 subjects fulfilled the inclusion

criteria. A total of 30 subjects completed the study and were initially randomized into two groups. Group A (n=15), and Group B (n=15) as shown in Fig (1) which presents the flow diagram of patients throughout the study.

Fig 1: Flow of participants through the study.



The unpaired t-test proved that there was no significant difference between their ages (P=0.246) and BMI values (P=0.973). Demographic characteristics are presented in Tab. 1. Table 2 demonstrates the limb size circumference scores, the results showed that there was significant difference of the limb size circumference-scores pre and post treatment in each group as p value 0.000 In comparing both groups pretreatment and both groups post treatment, the results showed that there was non- significant differences where p value are 0.488, 0.586 respectively.

Table 1: Demographic data of participants.

General characteristics	Group A				Group B				Comparison		S
	Mean	±SD	Min.	Max.	Mean	±SD	Min.	Max.	t-value	P-value	
Age (year)	55.93	± 2.374	51	58	55.16	± 2.342	50	58	0.851	0.409	NS
BMI (kg/m^2)	28.18	± 0.790	26.5	29.3	27.79	± 0.781	26.8	29.1	1.261	0.228	

*** NS: No significant SD: standard deviation**

Table 2: Pre and post treatment within groups and for each group mean values scores in limb volume.

	Group A	Group B	t-value	P value
Limb volume (cm^3) Pre	635.6±0.534	668.2±0.483	0.712	0.488*
Limb volume(cm^3) Post	447.3±0.396	430.2±0.477	0.557	0.586*
t-value	16.309	13.198		
P value	0.000**	0.000**		

*** No significant difference * * Significant difference**

Table 3 demonstrates the grip strength scores, the results showed that there was significant difference of the grip strength scores pre and post treatment in each group as p value 0.000. In comparing both groups pretreatment and both groups post treatment, the results showed that there was non- significant differences where p value are 0.825 ,0.241. respectively.

Table 4 demonstrates Boston questionnaire scores, the results showed that there was significant difference of Boston questionnaire mean scores pre and post treatment in each group as p value 0.000. In comparing both groups pre treatment and both groups post treatment, the results showed that there was non- significant differences where p value are 0.913, 0.703 respectively.

Table 3: Pre and post treatment within groups and for each group mean values scores in grip strength.

	Group A	Group B	t-value	P value
Grip strength (Kg) Pre	4.03±0.847	4.10±0.892	0.225	0.825*
Grip strength (Kg) Post	6.88±0.492	6.64±0.513	1.223	0.241*
t-value	13.94	9.297		
P value	0.000**	0.000**		

*** No significant difference * * Significant difference**

Table 4: Boston questionnaire mean scores Pre and post treatment within groups and for each group.

	Group A	Group B	t-value	P value
Boston questionnaire average scores Pre	3.74±0.341	3.75±0.385	0.113	0.912*
Boston questionnaire average scores Post	1.80±.369	1.87±0.373	0.389	0.703*
t-value	13.397	15.932		
P value	0.000**	0.000**		

*** No significant difference * * Significant difference**

DISCUSSION

This study was conducted to compare the effect of KT versus LLLT in treating CTS secondary to post-mastectomy lymphedema. The results showed that there was significant difference of the limb size circumference,grip strength and Boston questionnaire scores for pre and post treatment in each group as p values were 0.000,0.000,0.000 respectively while that there was no significant difference of the limb size circumference, grip strength and Boston questionnaire scores for post treatment within groups as p values were0.488, 0.586, 0.825, 0.241, 0.912, 0.703 respectively.

KT have several benefits relying upon the amount of stretch applied to the tape during application through providing a positional stimulus through the skin, appropriate arrangement to fascial tissues, creating more space by lifting fascia and soft tissue above area of pain/

inflammation, providing sensory stimulation, assisting or constraining movementand to aid in the removal of edema through directing exudates toward a lymph channel [24].It is theorized to have several functions as reestablishing correct muscle function, diminishing congestion by enhancingthe blood flow and lymphatic fluid, decreasing pain by stimulating neurological system, adjusting misaligned joints and provides immediate sensorimotor feedback regarding functional abilities [25]. It was suggested that pain relief by means of KT use due to pain modulation via the gate control theory [26] because in light of the fact, it has been suggested that that tape stimulates neuromuscular pathways by increasing afferent feedback all through increase mechanical receptors release to spinal cord so block pain [27].

There are theories with respect to the impact of Laser in pain and inflammation control,the impact of low energy laser is not thermal; rather it is believed to stimulate microcirculation and endorphin release also block the enzymes that block pain enzymes results in reduction of pain and inflammation[28, 29].

Our results agree with Rania et al. [30], who compared the effect of traditional physical therapy program (strengthening and stretching exercises for wrist muscles and ligaments) with KT versus traditional treatment only on pain intensity and the study revealed that there was significant decrease in pain level in both groups with high significance in the group that received traditional physical therapy program with KT compared to the other one.

In line with our study, in a review published by Naeser [31], the efficacy of Laser on CTS symptoms was examined**,** in that review five studies were evaluated which revealed that real laser to have a better effect than sham laser in treating CTS and on the other hand, two studies did not observe real laser to have a better effect than a control condition to treat CTS. There was no significant difference of the limb size circumference, grip strength and Boston questionnaire mean scores for post treatment within groups in limb size circumference, grip strength and Boston questionnaire scores as CTS was secondary to lymphedema and once the edema decreased the secondary complications subsequently decreased.

Unfortunately, for advanced cases of CTS, surgery still remains a treatment of choice, but for mild to moderate stages of the condition, laser therapy has been shown to provide significant relief and improvement. Despite the widespread use of LLLT as one of the most popular and commonly used modalities in the field of physiotherapy, there is still limited evidence of its effectiveness. The effect of LLLT in treating patients with CTS; often with varying methodology qualities and have not been able to provide evidence regarding its usefulness [32].

On the other hand, Chang et al. [33].reported no significant difference in maximal grip strength measured under three conditions (without taping, with placebo taping, and KT) in 21 healthy collegiate athletes.

In the study of Kulcu et al, [34]. patients were evaluated soon after the 4-week treatment period. However, the patients were not followed up to evaluate how long the efficacy of the KT persists. There was no evidence on the efficacy of KT treatment for CTS. Further clinical studies are needed to determine the long-term therapeutic benefits of KT on CTS patients.

Limitation of study: Psychological status of patients at the time of measurement or treatment might affect the results. Also larger sample sizes were needed.

CONCLUSION

On the basis of the finding of this study, both KT and LLLT are effective in treating CTS secondary to post-mastectomy lymphedema in addition to IPC, strengthening, stretching exercises for wrist muscles and ligaments. Studying possible different treatment for CTS may assist clinicians in developing effective interventions programs during rehabilitation of post-mastectomy lymphedema.

Conflicts of interest: None

REFERENCES

[1]. Foldi M.; Foldi E. Foldi's Textbook of Lymphology for Physicians and Lymphedema Therapists. Foldi, M.; Foldi, E., editors. Mosby Elselvier; 2006.

[2]. Petrek J, Senie R, Peters M, Rosen P. Lymphedema in a cohort of breast carcinoma survivors 20 years after diagnosis. Cancer 2001;92(6):1368–1377.

[3]. Ganelm A, Engel J, Sela M and Brooks M. Nerve entrapments associated with postmastectomy lymphedema. Cancer 1979;44(44):2254-2259.

[4]. Assmus H, Staub F. Postmastectomy lymphedema and carpal tunnel syndrome. Surgical considerations and advice for patients.Handchir Mikrochir Plast Chir. 2004;36(4):237-240.

[5]. Bozentka D, Beredjiklian P, Chan P, Schidt S, Buzby G and Bora F. Hand Related Disorders Following Axillary Dissection for Breast Cancer. The Uni of Pennsylvania Ortho J 2001;14:35–37

[6]. Sucher B, Schreiber A. Carpal tunnel syndrome diagnosis. Phys Med Rehabil Clin N Am. 2014;25:229–247.

[7]. Ezzo J, Manheimer E, McNeely M, Howell D, Weiss R and Johansson K, et al. Manual Lymphatic Drainage for Lymphedema Following Breast Cancer Treatment. Cochrane Database Syst Rev, 2015;5:105-115.

[8]. Ridner S, Hooper E, Kanar C, Doersam J, Bond S and Dietrich M. A Pilot Randomized Trial Evaluating Low-Level Laser Therapy as an Alternative Treatment to Manual Lymphatic Drainage for Breast Cancer-Related Lymphedema. Oncol Nurs Forum. 2013;40(4):1-20.

[9]. Chmielewska D , Stania M, B³aszczak E, Kwaœna K. Intermittent pneumatic compression in patients with postmastectomy lymphedema. Fam Med Prim Care Rev 2016;18(4):419–424.

[10]. Bakhtiary A and Rashidy P. Ultrasound and laser therapy in the treatment of carpal tunnel syndrome. Aust J. of Phys Ther 2004;50:147–151.

[11]. Ke M, Chen L, Chou Y, Li T, Chu H, Tsai C and Wu Y. The dose-dependent efficiency of radial shock wave therapy for patients with carpal tunnel syndrome: a prospective, randomized, single-blind, placebo-controlled trial. Sci Rep. 2016;2(6):383-344.

[12]. Lau, R. W., & Cheing, G. L. Managing postmastectomy lymphedema with low-level laser therapy. Photomed Laser Surg,2009;27:763-769.

[13]. Palumbo CF and Szabo RM . Examination of patients for Carpal tunnel syndrome sensibility, provocation and motor teasting, Hand Clin, 2002;18 (2):269-77.

[14]. Karges, J. R., Mark, B. E., Stikeleather, S. J., & Worrell, T. W. Concurrent validity of upper extremity volume estimates: comparison of calculated volume derived from girth measurements and water displacement. Phys Ther, 2003;83:134-145.

[15]. Sander, A. P., Hajer, N. M., Hemenway, K., & Miller, A. C. Upper-extremity volume measurements in women with lymphedema: a comparison of measurements obtained via water displacement with geometrically determined. Phys Ther, 2002;82:1201-1212.

[16]. Levine D W, Simmons B P, Koris M J, Daltroy L H, Hohl G G, Fossel A H, Katz J N. A.Self-administered questionnaire for the assessment of severity of symptoms and functional status in carpal tunnel syndrome. Journal of Bone Joint Sur-gery [Am], 1993;75(11):1585-92.

[17]. Su C-Y, et al . Grip strength in different positions of elbow and shoulder. Arch Phys Med Rehabil, 1994;75(7):812-15

.[18]. Thurston A.Aetiology of the so-called 'idiopathic' carpal tunnel syndrome. Current Ortho, 2000;14(6): 448-56

[19]. Levine DW, Simmons BP, Koris MJ, Lawren HD, Gerri GH, Fossel AH, Katz JN . A self-administered questionnaire for the assessment of severity of symptoms and functional status in carpal tunnel syndrome. J Bone Joint Surg (Am), 1993;75:1585-1592

[20]. Nele D. Marijke V. Kampen I. Tina C. Marie-Rose C. Different physical treatment modalities for lymphedema developing after axillary lymph node dissection for breast cancer: A review. Europ J of Obst & Gyn and Reprod Bio, 2010;149:3–9.

[21]. Olszewski, W . Anatomical distribution of tissue fluid and lymph in soft tissues of lower limbs in obstructive lymphedema-hints for physiotherapy. Phlebolymphology, 2009;16:283-289.

[22]. Rania R. Ali, kadrya H. Battecha and Waleed T. Mansour . Influence of kinesio Tape in Treating Carpal Tunnel Syndrome Journal of Medical Science and Clin Res, 2013;1(1).

[23]. Tarek F. Elwakil , Alaa Elazzazi and Hisham Shokeir . Treatment of carpal tunnel syndrome by low-level laser versus open carpal tunnel release Lasers Med 2007;22:265–270.

[24]. kase T. Application of kinesio taping for treatment of sport injuries. Research Yearbook 2001;13(1):130-134.

[25]. Thelen m, Dauber J, Stoneman P. The clinical efficacy of kinesio tape for shoulser pain, A randomized, double-blinded, clinical trial. J Orthop Sports Phys Ther 2008;38(7):389-395.

[26]. Kneeshaw D. shoulder taping in the clinical setting. J Body w Mov Ther.2002;6:2-8.

[27]. Muller M, Tsui D, Schnurr R, Biddulph-Deisroth L, Hard J and MacDermid J. Effectiveness of hand therapy interventions in primary management of carpal tunnel syndrome: a systematic review. J of Hand Ther 2004;17(2):210–28.

[28]. Shooshtari S, Badiee V, Taghizadeh S, Nematollahi A, Amanollahi A and Grami M. The effects of low level laser in clinical outcome and neuro physiologicalresults of carpal tunnel syndrome. Electeromyogr Clin Neurophysio 2008;48: 229-231.

[29]. Raeissadat A and Reza Soltani Z. Study of Long Term Effects of Laser Therapy Versus Local Corticosteroid Injection in Patients with Carpal Tunnel Syndrome. J Lasers Med Sci 2010;1:24-30.

[30]. Rania R, kadrya H, Waleed T. Influence of kinesio Tape in Treating Carpal Tunnel Syndrome. JMSCR 2013;1(1):1-9.

[31]. Naeser M. Photobiomodulation of pain in Carpal tunnel syndrome: review of seven studies. Photomed Laser Surg 2006;24:101-110.

[32]. Barbosa R, Silva Rodrigues E, Tamanini G,et al, Effectiveness of low-level laser therapy for patients with carpal tunnel syndrome: design of a random

ized single-blinded controlled trial; BMC Musculoskelet Disord. 2012;13:248.

[33]. Chang HY, Chou KY, Lin JJ, Lin CF, Wang CH. Immediate effect of forearm Kinesio taping on maximal grip strength and force sense in healthy collegiate athletes. Phys Ther Sport 2010;11:122-127.

[34]. Kulcu D, ursali C, Aktas I, et al, Kinesiotaping as an alternative treatment method for carpal tunnel syndrome ,Turk J Med Sci. 2016;46:1042-1049.

How to cite this article:

Samah H. Nagib, Rania N. karkousha, Gehan A. Aly. COMPARISON OF KINESIOTAPING VERSUS LOW LEVEL LASER THERAPY FOR CARPAL TUNNEL SYNDROME IN POSTMASTECTOMY LYMPHEDEMA FOR POSTMENOPAUSAL WOMEN0. Int J Physiother Res 2017;5(5):2337-2343. **DOI:** 10.16965/ijpr.2017.206