EFFECT OF KINESIO TAPING ON MYOFASCIAL PAIN SYNDROME POST NECK DISSECTION SURGERY

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Abstract: Significant as well as noticeable neck morbidity, such as pain, loss of sensation, and limited range of motion, was observed after cancer treatment. Two forms of neck pain, neuropathic as well as myofascial have been identified in a study of 25 patients with chronic neck pain after neck dissection. In addition, among 220 patients who had neck dissection, 33% experienced neck pain and 46% experienced myofascial pain.
Objective: The study was conducted to examine the impact of Kinesio taping on myofascial pain syndrome after neck dissection surgery.
Methods: Sixty male and female patients who had cervical myofascial pain syndrome (MFPS) after a neck dissection surgery participated in this study. They were between the ages of 30 and 45. Participants were recruited from Cairo University's National Cancer Institute and divided evenly between two groups. Thirty people were assigned to Group A (the Kinesiotaping group), where they were given conventional program as well as Kinesiotaping three times a week for a period of one month. Thirty patients were assigned to Group B (the control group), where they were given the conventional program of treatment (ROM exercises, stretching exercises, as well as Deep friction message) three times weekly for a month. A visual analogue scale (VAS) as well as pressure algometry were used to measure the level of pain. To measure the side bending as well as neck rotation neck on either side, a goniometer was utilized. All measurements were taken before and after the treatment was given.
Results: Kinesio taping group showed greater significant enhancement in all outcome measures after treatment than the control group ($p>0.001$).
The findings of the study revealed that PPT, VAS and in bending toward and away, rotation toward and away the side of the operation, values were significantly improved in the KT (98.8%, 45.94, 27.97, 26.12, 21.89 and 22.74% respectively)
Conclusion: We found that the Kinesio taping group had better outcomes with no adverse effects after neck dissection, confirming the effectiveness of Kinesio taping for managing cervical myofascial pain.

Keywords: Myofascial pain syndromes, Neck dissections, Kinesio taping, visual analog scales, Pressure algometry.

1. INTRODUCTION

Tumors of the head and neck may be treated with surgery, radiotherapy, or a combination of the two. Lymph nodes in the neck can get affected by cancer that originated in the neck and head area.As part of the treatment for these tumors, neck dissection surgery is performed, which entails the excision of the pertinent draining lymph nodes [1].Surgical dissection of the neck can be done in a number of different ways. A radical neck dissection is a surgical procedure that removes lymph nodes from a single side of the neck as well as the sternocleidomastoid muscle, the internal jugular vein, as well as the spinal accessory nerve. As a result of the alterations made to the radical neck dissection, the patient's vital tissues are protected. Essential anatomical structures can be saved by doing a selective neck dissection [2-3]. Surgical procedures on the neck and shoulders for treating head as well as neck cancer can cause pain and stiffness in the area of the neck and shoulders, as well as restrict movement in those areas. Significant neck morbidity, such as pain and limited range of motion, was observed after cancer treatment [4]. Two forms of neck pain, neuropathic as well as myofascial, have been identified in an investigation of 25 individuals with chronic neck pain after neck dissection [5]. Additionally, 33% and 37% of 220 patients who received neck dissection surgery experienced pain in their shoulders and neck, respectively, whereas 32% and 46% experienced neuropathic as well as myofascial problems, respectively [4].Trigger points in the muscles or fascia are characteristic of the regional pain syndrome known as myofascial pain syndrome (MFPS). Trigger points in the trapezius muscle are a common source of shoulder as well as neck pain. Tense bands in the impacted muscles can be palpated for the hypersensitivity nodules that define myofascial trigger points (MTPs). The trapezius is the

muscle most commonly affected by MPS, and its symptoms can spread throughout the shoulder and neck. Trigger points can account for anywhere from 30% to 85% of cases of MFPS [6].Muscle as well as soft tissue pain is often reported alongside the "chronic dull aching pain" that is characteristic of MFPS. Latent trigger points (TrPs) are the source of the mildest symptoms; they don't harm, but they do limit mobility and produce stiffness. Involvement at a higher level causes pain associated with the muscle's position or action, while involvement at the highest level causes pain even when the muscle is at rest [7]. Pressure algometry for measurement of pain threshold can be used to diagnose MFPS [8]. Muscle tenderness, trigger points, as well as localized or referred pain are all findings from a physical examination of the affected area [9] The usual care for MFPS includes medication (painkillers, low dose anti-depressants), splints, collars, rest, physiotherapy (mainly ultrasound, interferential therapy, traction, stretching and strengthening) [7]. Non-invasive techniques like kinesio taping (KT) are also utilized to treat MFPS. In 1970, KenzoKase created KT and began applying it to musculoskeletal conditions. In KT, an elastic, thin, adhesive bandage that can be expanded up to 140% of its original size is used as a therapeutic tool. By widening the space between skin as well as soft tissue, it aids muscle, fascia, and joints and promotes better blood flow and lymphatic drainage [10]. Therefore, KT improves musculature in terms of strength, tone, range of motion, and oedema/inflammation. It can also influence cutaneous mechanoreceptors responsible for proprioceptive as well as nociceptive stimulations [11]. The purpose of this study was to investigate the effectiveness of KT as an additional physiotherapeutic technique in the treatment of MPS following a neck dissection surgery, with a focus on pain reduction and increased range of motion in the cervical spine. The goal of this study is to find a non-invasive, efficient therapy for MPS that doesn't require turning to invasive modalities or oral drugs that have too many side effects to be sustained over the long term.

2. MATERIALS AND METHODS

- **STUDY DESIGN**

Informed consent was gained after a thorough explanation of the study was provided. Using the envelope method, the patients were divided into two groups of equal size. Participants' consent forms were sealed in envelopes labeled "Kinesio taping group" or "control group," and the physiotherapist performing the random assignment was blinded to the group assignment. Patients were placed in their designated groups based on the cards they randomly selected. The allocated therapy was started at a predetermined date after the initial week of randomization. The examining physiotherapist was not a part of the randomization process and did not know who would be receiving therapy. During the evaluation with a physiotherapist, patients were instructed to keep their therapy assignment a secret. All participants were instructed to report any adverse reactions they experienced while receiving therapy.

- **SAMPLE SIZE DETERMINATION**

Utilizing G*POWER statistical software (version 3.1.9.2; Franz Faul, Universitat Kiel, Germany), the minimum number of individuals needed for the present study was determined to be 30 for each group. Allocation ratio N2/N1 = 1 was used in the calculations, along with alpha=0.05, power=80%, effect size=0.74, as well as effect size=1.

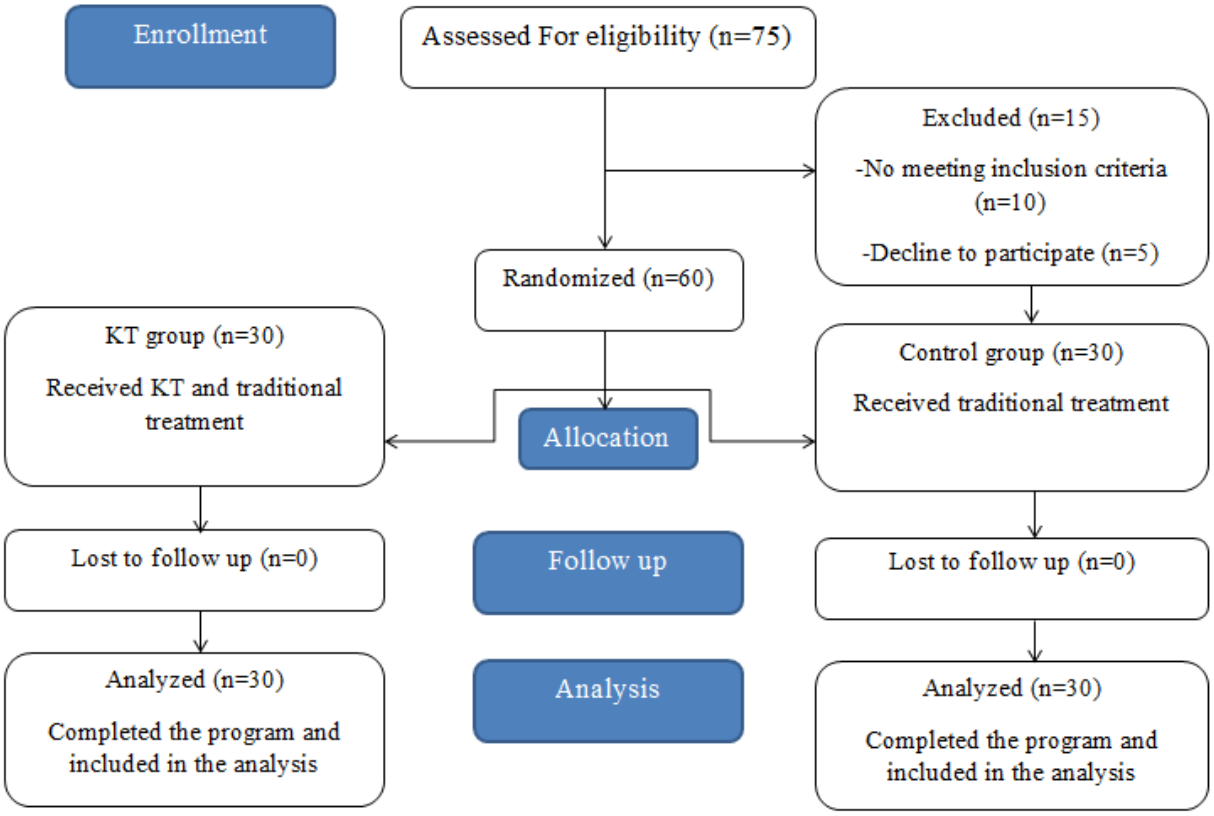

Figure 1: Consort Flow chart of the study

- **SUBJECTS**

Sixty male and female patients who had cervical MFPS after a neck dissection surgery took-part in this study. They were between the ages of 30 and 45. Participants were divided evenly between two groups after being recruited from the National Cancer Institute at Cairo University. If a patient met any of the following requirements, they were invited to participate in the trial: (1) Men and women, ages 30 to 45, were included in the analysis. (2) At least three months of reported upper trapezius MPS (3) moderate to severe degree of pain (VAS score >= 4). patients were excluded from the study if they have: (1) A cervical disk prolapse. (2) Spondylolisthesis or a fracture of the cervical vertebrae. (3) Arthritis rheumatoid, (4) Mental disorders or epilepsy.

- **Outcome measures**

➢ ***VAS***

The patients' levels of pain were measured on a numeric scale from 0 to 10 using the VAS. Subjects were instructed to place a mark on the line from 0 (no pain) to 10 (the greatest possible pain) based on their current level of pain.

➢ ***Pressure algometer:***

A pressure algometer (Baseline2-pound Dolorimeter/Algorimeter pain threshold meter) was used to measure the pressure required to cause pain at the trigger points (PPT).Until an individual experiences pain, a Standardized (1.52 cm2) flat round probe is pressed against their skin. The participants were instructed to report any painful pressure sensations and to stop applying pressure immediately. On the first visit, a marking was placed over the area that pained the most. Three separate readings were taken and averaged.

➢ ***Goniometer***

When the patient was seated, the active range of motion of the neck (side bending as well as rotation on each of the sides.) was assessed with a goniometer. The subject was instructed to bring their ear to their respective shoulder to side bend their cervical spine. The range was measured in degrees to the closest whole number, as well as the goniometer's moving arm was adjusted at the final stage of the motion. The subject was tasked with rotating only his cervical vertebrae by looking across his right or left shoulder. When the assessor reached the limit of the

available range, they kept the fixed arm in place while readjusting the movable one.

- **Intervention**

Traditional treatment (range-of-motion (ROM) exercises, stretching exercises, as well as Deep friction massage) was provided to both groups three times weekly for a month. Kinesiotaping (Healthtrek Therapeutic & Sport Kinesiology Tape KT-5462) was also applied to the members of the experimental group (the Kinesiotaping group). While seated, the patient was instructed to perform a side bending of the neck toward the opposite side and a head rotation toward the same side. Before using KT (the inhibition technique done per the KenzoKase method), an anchor was placed below the acromion and the first portion of the band was stretched to its limit. For a whole month, Kinesio tape was used (once per week, for three days; placed a couple of times with one day off in between).

STATISTICAL ANALYSIS

The age of the groups was compared using an unpaired t-test. The Chi-squared test was performed to examine the distribution of sexes and side of dissection among the groups. The Shapiro-Wilk test was used to ensure that the data followed a normal distribution. The homogeneity of the groups was tested using Levene's test for homogeneity of variances. Mean values on the VAS, PPT, as well as ROM were compared between groups using an unpaired t-test. The pre- and post-treatment characteristics of each group were compared using a paired t-test. All statistical tests were performed at the $p < 0.05$ level of significance. The Windows version of IBM's Statistical Package for the Social Sciences (SPSS) version 22 (IBM SPSS, Chicago, IL, USA) was used for all statistical analysis.

RESULTS

Subject characteristics:

Subject demographics for both Group A and Group B were displayed in **Table 1**. There was no statistically significant difference ($p > 0.05$) in the distribution of gender, age, or dissection side among the groups.

Table 1 Comparison of subject characteristics between study and control groups:

	Group A	Group B		
	Mean ± SD	Mean ± SD	t- value	p-value
Age (years)	40.06 ± 3.99	39.60 ± 3.94	0.46	0.65
gender, N (%) Females	21 (70%)	18 (60%)	(χ2= 0.65)	0.41
Males	9 (30%)	12 (40%)		
Side of ND, N (%)				
Right	15 (50%)	16 (53%)	(χ2= 0.06)	0.79
Left	15 (50%)	14 (47%)		

SD, Standard deviations; χ2, Chi squared value; p value, Probability value.

Effect of treatment on VAS, PPT and ROM:

- Within group comparison:

There was a significant decrease in VAS and increase in PPT after treatment compared to pre-treatment values in Groups A and B ($p > 0.001$). Comparing groups, A and B, the percentage of change in VAS as well as PPT was 45.94 and 98.8%, respectively. **(Table 2).**

In both Groups A and B, post-treatment side bending as well as rotation towards and away from the side being

treated was significantly higher than pre-treatment ($p > 0.001$). In group A, the percentage of change of side bending and rotation either towards as well as away from the side being treated was 27.97, 26.12, 21.89, as well as 22.74% respectively, while in group B, the percentage of change were 21.72, 19.89, 14.68, as well as 9.91% respectively **(table 3).**

- Between group's comparison:

Pretreatment comparisons showed no statistically significant differences among the groups. After treatment, the VAS of group A was significantly lower and the PPT was significantly higher than that of the control group compared to the baseline ($p < 0.05$). **(Table 2).**

When comparing Group A and Group B's range of motion following treatment, it was found that Group A had significantly greater bending as well as rotation towards and away from the operated side. **(Table 3)**

Table 2. Mean VAS as well as PPT pre and post treatment of study and control groups:

	Group A	Group B			
	Mean ± SD	Mean ± SD	MD	t- value	p value
VAS					
Pre treatment	6.16 ± 1.14	6.53 ± 1.38	-0.37	-1.11	0.26
Post treatment	3.33 ± 0.95	4.5 ± 1.04	-1.17	-4.51	0.001
MD	2.83	2.03			
% of change	45.94	31.09			
t- value	18.61	8.08			
	p = 0.001	p = 0.001			
PPT(kg)					
Pre treatment	1.67 ± 0.54	1.71 ± 0.55	-0.04	-0.35	0.72
Post treatment	3.32 ± 0.90	2.85 ± 0.72	0.47	2.21	0.03
MD	-1.65	-1.14			
% of change	98.80	66.67			
t- value	-9.71	-15.81			
	p = 0.001	p = 0.001			

SD, standard deviation; MD, mean difference; p-value, probability value

Table 3. Mean ROM pre as well as post treatment of study and control groups:

ROM (degrees)	Group A	Group B			
	Mean ± SD	Mean ± SD	MD	t- value	p value
Bending toward side of operation					
Pre treatment	30.03 ± 5.28	29 ± 5.48	1.03	0.74	0.46
Post treatment	38.43 ± 5.07	35.3 ± 4.54	3.13	2.52	0.01
MD	-8.4	-6.3			
% of change	27.97	21.72			
t- value	-6.55	-4.99			
	p = 0.001	p = 0.001			
Bending away from side of operation					
Pre treatment	29.36 ± 5.62	28.3 ± 3.43	1.06	0.88	0.37
Post treatment	37.03 ± 5.38	33.93 ± 4.45	3.1	2.42	0.01
MD	-7.67	-5.63			
% of change	26.12	19.89			
t- value	-4.85	-7.48			
	p = 0.001	p = 0.001			
Rotation toward side of operation					
Pre treatment	59.4 ± 6.03	58.86 ± 7.92	0.54	0.29	0.77
Post treatment	72.4 ± 4.47	67.5 ± 5.38	4.9	3.38	0.001
MD	-13	-8.64			
% of change	21.89	14.68			
t- value	-10.08	-7.13			
	p = 0.001	p = 0.001			
Rotation away from side of operation					
Pre treatment	58.36 ± 8.05	57.23 ± 8.05	1.13	0.54	0.58
Post treatment	71.63 ± 5.36	62.9 ± 6.81	8.73	5.51	0.001
MD	-13.27	-5.67			
% of change	22.74	9.91			
t- value	-7.63	-4.99			
	p = 0.001	p = 0.001			

SD, standard deviation; MD, mean difference; p-value, probability value

Ethical approval

The Ethical Committee of the Faculty of Physical Therapy, Cairo University, has approved this trial and confirmed that it complies with all applicable national rules and institutional norms. Clinical Trials Registry registration (NCT05265884) was completed retrospectively for this trial.

Informed consent

All participants gave their informed consent before being enrolled in the study.

DISCUSSION

Kinesio taping (KT) is a technique utilized in rehabilitation programs. Although it has traditionally been utilized in orthopedic and sports contexts, it is now being employed as an additional therapy option for other musculoskeletal disorders. It has the capacity to strengthen weakening muscles, regulate joint instability, aid in postural alignment, and calm overworked muscles [12].

In regard to Kinesiotaping group outcomes, there was a substantial drop in VAS and an rise in PPT following treatment in comparison with pre-treatment ($p > 0.001$). The VAS and PPT percent changes were 45.94 and 98.8%, respectively while in controlled group were31.09 and 66.67% respectively. There was a substantial improvement in bending as well as rotation towards and away from the affected side after therapy in comparison with pre-treatment ($p > 0.001$). The percent change in Kinesiotaping group in bending towards and away from the operation side, rotation towards and away from the operation were 27.97, 26.12, 21.89, and 22.74%, respectively while in controlled group were 21.72, 19.89, 14.68 and 9.91% respectively.

KT has been evaluated in several different studies, Yasar et al., 2021 [11] demonstrated statisticallysignificantimprovementofpainandpressurepainthresholds in patients with MPS participants were randomly assigned to either an exercise-only (control) or KT-and-exercise (KT) group. At baseline as well as at the end of the 2nd week, a blinded evaluator evaluated the patient's VAS as well as PPT. The study found that KT considerably increased PPT and decreased VAS ratings (1.61 1.25 and 2.66 1.24, respectively). When it comes to alleviating pain, reducing disability, and improving the quality of life overall, the KT approach is superior to the control group in patients with MPS. Adding KT to an existing exercise regimen may make significant benefits to the therapy of MPS, according to the study's findings. When it comes to relieving pain, the findings of this study are consistent with our own.

According to Ay et al. created a study with 61 MPS patients who were split evenly into two groups. Kinesio taping was applied to group 1 ($n = 31$) five times at 3-day intervals over 15 days, while sham taping was applied to group 2 ($n = 30$). The range of motion in the cervical spine and the patient's tolerance to pain from pressure were both taken into account. The active cervical range of motion was determined by goniometry, the PPT was recorded with an algometer, and pain was rated with a VAS. In both groups, post-treatment discomfort, PPT, and cervical range of motion improved significantly ($p < 0.05$). In addition, there were significant differences ($p<0.05$) in pain, PPT, and cervical flexion-extension across the groups. The results from this research, showing a considerable reduction in both pain intensity and threshold, are supported by those of the earlier study. Nevertheless, there is difference in the cervical ROM outcomes, as in our statistical increase in ROM was recorded, the possible explanation for this difference may be due to the impact of conventional treatment (ROM exercises, stretching exercises, as well as Deep friction message) which is lacked in the previous study.

(Azatcam et al., 2017 [14]) Patients with myofascial pain syndrome were randomly assigned to one of 3 groups: TENS + Exercise, KT + Exercise, or exercise. The goal of this study was to compare the immediate and long-term benefits of TENS as well as KT on pain and ROM in these patients. After 3 months of treatment, there was statistically significant improvement across the board in VAS, pain threshold, as well as contralateral side bending values ($p = 0.01$). Following treatment, the KT group was more effective than the TENS group and the control group on the VAS, PPT, as well as contralateral side bending score. There are similarities between the previous study and our study in using Kinesiotaping and the same methods of assessment; the findings of this study agreed with our findings to the extent that the effectiveness of KT in pain management and cervical ROM was outlined.

According to Abdelfattah et al., 2016 [15] Research the effects of Kinesio taping on individuals with neck myofascial pain syndrome, focusing on PPT as well as pain severity. Each of the two groups, with 15 patients in total, was assigned at random. Group 'A' received Kinesio tape for three consecutive days. The 'B' (control) group did not participate in any form of physiotherapy. Patients in the control group and those who received Kinesio tape were assessed using a pressure algometry, VAS prior to, during, and after the three-day treatment period. Kinesio tape group showed statistically significant improvements in PPT (46%), pain level (40%), as well as function disability index (52%). Kinesio tape is a promising therapy for myofascial pain in the neck, as compared to the control group, where no significant changes were seen in the same variables. Liu et al., 2019. Kinesio taping was found to be more efficient than other treatments for decreasing pain intensity (mean difference (MD) = 1.06 cm, 95% CI: 1.66 to 0.46 cm, $P = 0.006$) as well as improving ROM (standardized mean difference (SMD) = 0.26, 95% CI: 0.09 to 0.43 cm, $P = 0.003$) in meta-analyses of 20 randomized controlled trials (RCTs) including 959 patients. KT was additionally more effective than other non-invasive methods in reducing pain intensity over time (mean difference [MD] = 0.68 cm, 95% confidence interval [CI]: 1.22 to 0.13 cm, $P = 0.02$). KT was found to be statistically significant in reducing pain intensity and increasing ROM in patients with myofascial pain syndrome after treatment.

Patients having myofascial pain syndrome who were treated with KT reported significant reductions in pain and increases in upper trapezius muscular strength (ztürket et al., 2016 [17]). When 37 individuals who had active myofascial trigger points in their upper trapezius were allocated into two groups; group 1 were given KT to the upper trapezius, whereas group 2 were given sham taping. Measurements on trapezius muscle strength as well as neck

pain using VAS were obtained pre- and post-KT, as well as at the one-month follow-up. There was a statistically significant difference between the groups in terms of the mean changes in algometry values from T2 to T3, with the shift favoring group 1. At T2, compared to T1, there was a statistically significant difference between the groups in the average changes in trapezius muscle strength. Consistent with the findings of the studies mentioned above, it can be hypothesized that improving the amount of subcutaneous space facilitates lymphatic drainage and flow, thereby contributing to the overall efficacy of KT in the management of MPS. Possible mechanisms for the impact of KT on ROM include an enhancement in blood flow in the taped area, physiological adaptations that allow for greater ROM, and a decline in pressure on neural receptors situated below the skin. Tape can also contribute to better joint biomechanics as well as alignment, lower protective muscle guarding as well as pain, encourage ligament as well as tendon function, and enhance kinesthetic consciousness. The KT group showed statistically significant improvements in neck ROM, PPT, and VAS compared to the control group ($p>0.001$). The short sample size, inadequate follow-up, and lacking shoulder pain and range-of-motion evaluations that may give stronger statistical analysis were all limitations of this study. The efficacy of KT in MPS should be evaluated and confirmed in larger-scale studies. Long-term effects of KT can only be seen by follow-up research.
Finally, after a neck dissection, KT is a viable option for treating cervical MPS. According to these findings, KT has the potential to serve as a secondary therapy option for cervical MPS after neck dissection.

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Disclosure statement

There is no conflict of interest between the authors and the study presented here.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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