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INTEGRATED NEUROMUSCULAR INHIBITION TECHNIQUE VERSUS KINESIOTAPE ON UPPER TRAPEZIUS MYOFASCIAL TRIGGER POINTS A RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Background: This study was designed to inspect the effects of integrated neuromuscular inhibition technique (INIT) and kinesiotape (KT) on upper trapezius myofascial trigger points.

Methods: Sixty subjects with active trigger points (53 females and seven males) were divided haphazardly into three equal groups. Group "A" received INIT three times/week while group "B" received KT twice per week for four weeks. Group "C" (control group) didn't receive any treatment but follow instructions. Visual Analogue Scale (VAS), Arabic Neck disability index (ANDI) and cervical range of motion (CROM) were used to evaluate subjects at two intervals (pretreatment and post-treatment).

Results: Statistical analysis shown that there was a significant change within-group of VAS, ANDI, side bending at both side pre-post treatment at groups A, B and C while ($p<0.05$). Between-group analysis there was no significant change in pre value of all variables as ($p>0.05$) while post-treatment there was a significant change in all variables as ($p<0.05$).
Conclusion: INIT and KT are most effective methods in the management of subjects with active trigger points at upper trapezius myofascial trigger points with superiority for INIT.

Keywords: integrated neuromuscular inhibition technique, kinesiotape, myofascial trigger points.

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INTRODUCTION

Myofascial pain syndrome (MPS) is current musculoskeletal pain disorder that affects the majority of chronic pain population [1,2]. The existence of trigger points identifies it. According to Shah et al., (2016) trigger points were described as" hyper-excitable points within a rigid line of skeletal muscles" [2]. This syndrome usually associated with tenderness, spasm, movement limitation and referral pain. These active points are usually seen in the upper fiber trapezius as a result of overload and microtrauma [3,4].

Trigger points can be classified according to pain intensity into active and latent depending on the characteristic of pain. Active trigger points refer pain at rest without any pressure and during activity while latent trigger points refer pain only during direct pressure [2]. Trigger points perpetuated by abnormal posture and emotional disorders [5]. The most widespread management approaches that are used for handling of this points are needling therapies [6], Integrated Neuromuscular Inhibition (INIT) [7], Muscle Energy Techniques (MET) [7], Strain Counter Strain (SCS) [8], LASER [9], Ischemic Compression (IC) [10], Kinesiotape (KT) [11] and spray and stretch technique [12].

The efficacy of INIT in the management of subjects with excitable points reported in many trials [9,13,14]. It was supposed that the refinement in pain intensity, function and range of motion due to the increased blood supply by intermittent pressure, muscle relaxation by SCS and tone reduction by MET. The other treatment option in the management of excitable points was kinesiotape (KT). In the current period, KT strongly entered in the management of this points due to its role in increasing blood supply, improve lymphatic fluid flow and restore muscle function [15,16]. Numerous researchers confirmed a weighty role of KT on decrease pain intensity [11,17,18,19]. Improve range of motion and neck function [17,19]

The poor relationship between radiographic confirmation and medical signs lead to great interest in the causes and management of these excitable points [20]. The uncertainty increased due to lack of scientific evidence to support particular treatment approaches for subjects with active trigger points. Therefore, the physical therapist has a difficulty and distraction in choosing the most appropriate method of treatment for each subject [21]. Furthermore, the absence of passive control group that doesn't receive treatment in almost of clinical trials makes it so difficult to distinguish between the efficacy of management and the normal pathway of the disorder. So, this research was conducted to contrast the efficacy of INIT and KT in the refinement of pain, function, and range of motion (ROM) in subjects with upper trapezius active trigger points and compare it with a control group.

MATERIALS AND METHOD

This research was performed at the treatment center at the Faculty of Physical Therapy, Cairo University. The study was conducted during the period of eleven months from February 2017 to December 2017. The protocol was accepted by Research Ethics Committee of Faculty of Physical Therapy (NO: P. T. REC/012/001517) and registered at Pan African Clinical Trial Registry. (Registry ID PACTR 201701001962265).

Specify Sample Size

The size of the sample has been determined using G*Power (version 3.1.9.2) (Franz Faul, Uni Kiel, Germany). This calculation was based on F test. The type I error was 5%, alpha-level was 0.05 and type II error was 95%. The effect size (0.506) was calculated on the main outcome (ANDI) from a pilot study on nine subjects. The optimal number for this research was 51 subjects.

Assessment of eligibility

Seventy subjects were assembled from the college (under and postgraduate) of physical therapy at Cairo University. During assessment for eligibility ten subjects excluded because five subjects received treatment at past three months and five subjects have the degenerative disease as shown in figure 1. Sixty subjects received verbal and written explanation for this research. If they decided to participate in this research, they signed the agreement form which accepted by the Faculty of Physical Therapy. Then they allocated randomly by sealed envelopes to three groups**:** Group (A): received INIT for one month three times per week +instructions. Group (B) received KT for one month twice per week on upper trapezius bilaterally +instructions. Group (C) didn't receive any treatment, but they follow instructions for one month, and all of them treated after completion of the study. The range of ages from 20 to 26 years (14) with average (23.18 ±1.63) years. The weight average was (61.43 ±7.4) kg, and the height average was (164.63 ± 6.29) cm. There was no significant change between groups as p-value < (0.46 - 0.84 - 0.63) respectively.

Inclusion and exclusion criteria

If the subjects had active trigger points at upper trapezius bilaterally, they involved in this research. The subjects had pain at rest, jump sign at pressure, limited ROM and referred pain [22]. If they had a history of cervical spine surgery, whiplash injury and any degenerative disease, they excluded from this research [23].

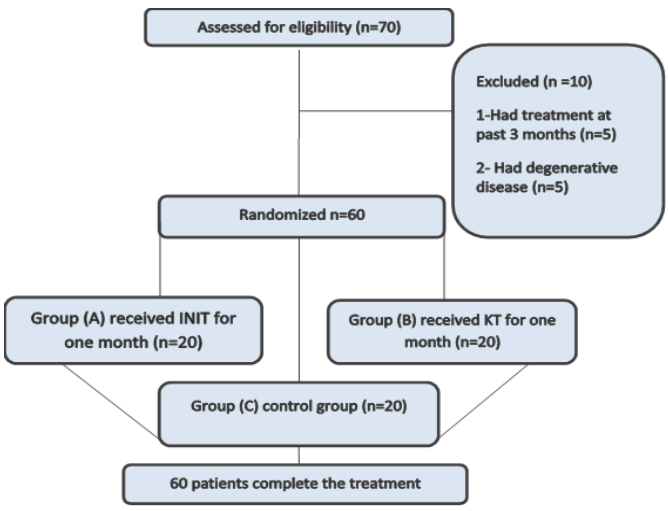

Figure 1: Flowchart diagram

Outcome measures

Assessment performed at baseline (before starting of treatment) and after one month of study. Outcome measures were pain intensity which assessed by visual analogue scale (VAS), neck function was assessed by Arabic neck disability index (ANDI), and finally, side bending motion of the neck was assessed by a cervical range of motion (CROM).

Pain intensity: The pain was assessed by a valid and reliable tool (VAS). It's a line has two ends. One has no pain, and the other has worst pain. To determine the pain intensity each subject was instructed to put a point on the line [24].

Neck function: Assessment of neck function was performed by Arabic neck disability index (ANDI). It is a valid and reliable tool in the assessment of neck function [25]. It contains ten category/classes. Each category contains six choices (0-5) [26]. The subject was asked to choose the most choice that describes their function. Then collect the number and determine the level of disability. Score from 0 to 4 no disability, From 5 to 15 this is mild, From 5 to 14 this is moderate, from 25 to 34 this is severe, more than 34 this is a complete disability [27].

Side bending motion: Left and right side bending were assessed by (CROM) (deluxe version-Performance Attainment Associates, Roseville, MN, USA). This equipment has a good to excellent inter-rater reliability (ICC 0.73–0.89) [28]. The subject was sitting in upright position, and both hands rested on the thigh. Hip and knee in flexion 90º, CROM was strapped around the head. The subject was requested to relax both shoulders then side bending the neck to one side within the limit of pain then back to starting position then bend to the other side while the investigator at the front of the subject.

Integrated neuromuscular inhibition technique:

To reduce tension at the upper fiber of trapezius the subject was positioned at supine. The site of trigger point identified by asking the subjects about the area of pain then by pincer palpation the investigator determines the trigger points. Once the trigger points identified intermittent ischemic compression started by the pincer grip of trigger point by using thumb and index. The pressure applied in an interrupted pathway five seconds on and five seconds off then continuously for 90 seconds depending on the tolerability of subjects then repeated three times per session. Strain counter strain started by applying pressure at trigger point and asked the subject about the level of pain. The subject head was passively side bending towards the affected side by one hand of the investigator. The other hand held the subject's forearm and moved the affected side shoulder passively to 90º of abduction while monitoring the trigger point pain then asked the patient about the degree of pain. If pain decreased by 70% from the beginning the position maintained for 90 seconds and repeated three times/session. After finishing strain counter strain muscle energy technique started. The affected side shoulder was stabilized by one hand of the investigator and the other hand on the mastoid area at the side of the head. The subject was requested to move the stabilized shoulder and ear towards each other. The contraction was maintained for seven seconds with 20% of maximum voluntary contraction. Then the muscle stretched for 30 seconds. This technique repeated three times per session [9,13,14].

Kinesiotape:

The sensitivity test was examined before applying kinesiotape. A small part of the tape was applied on the inner aspect of the arm for a day. Next day the tape was removed and if there was a reaction the subject was excluded but if no reaction the tape was applied. The subject would be seated in a comfortable position. The part to be taped was exposed, and the skin was shaved and cleaned with alcohol. For applying the Kinesio tape on upper trapezius, the tape was measured from the origin of muscle at the hairline to the insertion at the center of the acromion (I strip). Kinesio tape was taped firstly at the insertion at the acromion in the resting state. Then the subject was asked to stretch upper trapezius by applying side bending to opposite side and rotation to the same side with slight flexion. The Kinesio tape was taped with 10% tension over the muscle to the point of origin [11,18].

Treatment instructions:

All groups were given the following instructions [29]:

1-Be aware of your posture and change the neck position regularly.

2-Avoid maintaining the neck in a fixed position (prolonged static work).

3-Avoid lifting heavy weight on head or shoulder.

Statistical analysis:

The data were subjected to Shapiro wilk test to assess the normality of data. All variables were not normally distributed so non- parametric test was used (SPSS version 23) (IBM Corp, New York, United States). To detect the difference within each group, Wilcoxon signed ranks test was used. To determine the difference between groups at pre-treatment value and post-treatment values Kruskal-Wallis test was used. Alpha level was 0.05.

Characteristics of subjects:

Age, weight, height was normally distributed, so ANOVA was used to test the difference between groups as shown in table 1.

Table 1: characteristics of subjects; age, weight, and height

	Mean value ±SD "A"	Mean value± SD "B"	Mean value± SD "C"	f-value	p-value
(Age) years	22.85±1.46	23.20±1.67	23.5±1.76	0.79	0.46
(Weight) kg	61±8.5	61.05±6.5	62.25±7.37	.178	0.84
(Height) cm	164.15±8.06	164±4.5	165.75±5.96	0.47	0.63

Alpha level <0.05

Outcome results:

Mean values of pre-treatment and post-treatment, standard deviation (SD) and percent of change of VAS, ANDI, side bending of the head to the left (SB-Lt) and side bending of the head to the right (SB-Rt) within groups are shown in the table 2.

The results of VAS:

The mean value of VAS pre-treatment of group "A" was 7.65±0.81 while post-treatment was 2.75±0.79. The mean difference was 4.9, and the percent of change was -64.05%. Wilcoxon signed ranks test exposed that there was a significant decline in the mean value of VAS post-treatment compared with pre-treatment (p <0.0001).

The mean value of VAS pre-treatment of group "B" was 7.35±0.67 while post-treatment was 4.2±0.76. The mean difference was 3.15, and the percent of change was -42.85 %. Wilcoxon signed ranks test exposed that there was a significant decline in the mean value of VAS post-treatment compared with pre-treatment (p<0.0001).

Table 2: The effect of VAS, ANDI, SB-Lt, and SB-Rt within groups and between groups

out-comes	Groups	Group "A" Mean value ± SD	Group "B" Mean value ± SD	Group "C" Mean value ± SD	Between groups at pre-treatment
VAS	Pre-treatment	7.65±0.81	7.35±0.67	7.1±0.72	
	Post-treatment	2.75±0.79	4.2±0.76	5.3±1.78	
	Percent of change	-64.05%.	-42.85%	-25.35%	
P- value <		0.0001	0.0001	0.0005	0.11
ANDI	Pre-treatment	25.9±2.07	24.75±2.75	23.9± 3.05	
	Post-treatment	10.2±2.37	12.25±2.63	17.75±5.27	
	Percent of change	-60.62%	-50.51%.	-25.73%	
p-value <		0.0001	0.0001	0.0001	0.07
SB-Lt	Pre-treatment	34.45±4.24	31.25±3.27	32.7±5.1	
	Post-treatment	44.85±0.67	40.65±2.64	37.15±4.9	
	Percent of change	30.19%	30.08%	13.61%	
p-value <		0.0001	0.0001	0.02	0.051
SB-Rt	Pre-treatment	31.6±6.02	33.2±3.36	32.9±3.61	
	Post-treatment	44.25±1.83	41.6±2.19	37.85±4.61	
	Percent	40.03%	25.3%	15.04%	
p- value <		0.0001	0.0001	0.004	0.57

SD-Standard deviation, VAS- Visual analogue scale, ANDI- Arabic neck disability index, SB-Lt- Side bending to the left, SB-Rt- Side bending to the right. Alpha level <0.05.

The mean value of VAS pre-treatment of group "C" was 7.1±0.72 while post-treatment was 5.3±1.78. The mean difference was 1.8, and the percent of change was -25.35%. Wilcoxon signed ranks test exposed that there was a significant decline in the mean value of VAS post-treatment compared with pre-treatment (p <0.0005).

Kruskal-Wallis determined the difference between pre-treatment values of three groups and found no significant change as (p < 0.11) and chi-square =4.45 but kruskal-wallis found a significant change between post-treatment values of the three groups as (p <0.0001) and chi-square =27.35. The pairwise comparison by Mann-Whitney found a significant change between post-treatment values of group "A" and group "B" as (p <0.0001) and between A and C as (p<0.0001) but There was no significant change between B and C as (p < 0.12).

The results of ANDI:

The mean value of ANDI pre-treatment of group "A" was 25.9±2.07 while post-treatment was 10.2±2.37. The mean difference was 15.7, and the percent of change was -60.62%. Wilcoxon signed ranks test exposed that there was a significant decline in the mean value of ANDI post-treatment compared with pre-treatment (p<0.0001).

The mean value of ANDI pre-treatment of group "B" was 24.75±2.75 while post-treatment was 12.25±2.63. The mean difference was 12.5, and the percent of change was -50.51%. Wilcoxon signed ranks test revealed that there was a significant decline in the mean value of ANDI post-treatment compared with pre-treatment (p<0.0001).

The mean value of ANDI pre-treatment of group "C" was 23.9±3.05 while post-treatment was 17.75±5.27. The mean difference was 6.15, and the percent of change was -25.73%. Wilcoxon signed ranks test revealed that there was a significant decline in the mean value of NDI between pre and post-treatment (p<0.0001).

Kruskal-Wallis determined the difference between pre-treatment values of three groups and found no significant change as (p <0.07) and chi-square =5.23 but Kruskal-Wallis found a significant change between post-treatment values of the three groups as (p <0.0001) and chi-square =21.03. The pairwise comparison by Mann-Whitney found no significant change between post-treatment values of group "A" and group "B" as (p<0.08), but there is a significant change between A and C as (p<0.0001) and B and C as (p<0.005).

The results of SB-Lt:

The mean value of SB-Lt pre-treatment of group "A" was 34.45±4.24 degrees while post-treatment was 44.85±0.67 degrees. The mean difference was -10.40 degrees and the percent of change was 30.19%. Wilcoxon signed ranks test exposed that there was a significant rise in the mean value of SB-Lt post-treatment compared with pre-treatment as (p<0.0001).

As shown in the table (2) the mean value of SB-Lt pre-treatment of group "B" was 31.25±3.27 degrees while post-treatment was 40.65±2.64 degrees. The mean difference was -9.400 degrees and the percent of change was 30.08%. Wilcoxon signed ranks test exposed that there was a significant rise in the mean value of SB-Lt post-treatment compared with pre-treatment as ($p<0.0001$).

The mean value of SB-Lt pre-treatment of group "C" was 32.7±5.10 degrees while post-treatment was 37.15±4.9 degrees. The mean difference was -4.450 degrees and the percent of change was 13.61%. Wilcoxon signed ranks test exposed that there was a significant rise in the mean value of SB-Lt post-treatment compared with pre-treatment as ($p<0.02$).

The difference between pre-treatment values of three groups was determined by Kruskal-Wallis and found no significant change as ($p <0.051$) and chi-square =5.95. But there was a significant change between post-treatment values of the three groups as ($p <0.0001$) and chi-square =34.978. The pairwise comparison by Mann-Whitney found a significant change between post-treatment values of group "A" and group "B" as ($p<0.0001$) A and C as $p<0.0001$ and B and C as ($p<0.034$).

The result of SB-Rt:

The mean value of SB-Rt pre-treatment of group "A" was 31.6±6.02 degrees while post-treatment was 44.25±1.83 degrees. The mean difference was -12.65 degrees and the percent of change was 40.03%. Wilcoxon signed ranks test exposed that there was a significant rise in the mean value of SB-Rt post-treatment compared with pre-treatment as ($p<0.0001$).

The mean value of SB-Rt pre-treatment of group "B" was 33.2±3.36 degrees while post-treatment was 41.6±2.19 degrees. The mean difference was -8.40 degrees and the percent of change was 25.3%. Wilcoxon signed ranks test exposed that there was a significant rise in the mean value of SB-Rt post-treatment compared with pre-treatment ($p<0.0001$).

The mean value of SB-Rt pre-treatment of group "C" was 32.9±3.61 degrees while post-treatment was 37.85±4.61 degrees. The mean difference was -4.95 degrees and the percent of change was 15.04%. Wilcoxon signed ranks test exposed that there was a significant rise in the mean value of right side bending ROM post-treatment compared with pre-treatment as ($p<0.004$).

The difference between pre-treatment values of three groups was determined by Kruskal-Wallis and found no significant change as ($p <0.571$) and chi-square =1.12. But there was a significant change between post-treatment values of the three groups as ($p <0.0001$) and chi-square =26.51. The pairwise comparison by Mann-Whitney found that there was a significant change between post-treatment values of group "A" and group "B" as ($p<0.005$) A and C as $p<0.0001$ and B and C as $p<0.02$.

DISCUSSION

This research was directed to compare the efficacy of INIT and KT in the refinement of pain, function, and ROM in subjects with upper trapezius active trigger points. The consequences of the present study showed improvement in all three groups for all measured variables but the superiority for INIT. The effect of INIT may be attributed to the combined effect of three manual treatment techniques. Firstly, intermittent ischemic compression plays its role in the reduction of pain by stimulation of A-beta fibers that affect the pain gait during pressure and increase circulation when the pressure release [9,10,30,31,32]. Secondly, strain counter strain allows reduction of pain, improvement of function and ROM by placing the muscle at the passive shortened position. This position restores normal activity of muscle spindle and increases blood supply to the muscle [8,33,34,35]. Finally, muscle energy technique plays a key role in decrease pain; improve function and ROM by working on autogenic inhibition of muscle. This technique performed by applying isometric contraction of muscle that leads to activation of Golgi tendon organ that produces relaxation of the muscle. Furthermore, MET plays an important role in increasing range of motion by changes in muscle extensibility – reflex relaxation, viscoelastic change and stretch changes [32,35].

The consequences of this research come in agreement with Sibby et al., (2009) who presented the efficacy of INIT in the management of upper trapezius trigger points. Seventeen subjects involved in the study and divided into two groups. One group took "INIT," and the other group took "laser stretch." Outcomes were measured by Visual numeric scale (VNS), CROM and NDI. The subjects who received INIT found a significant improvement in VNS, ROM, and NDI [9]. Furthermore, Nagrale et al., (2010) presented the role of INIT on the upper fiber trapezius trigger points; measures were VAS, NDI, and ROM. Their study had two groups; One received MET and the other received INIT. Their results showed improvement in two groups but the superiority of the second group in all variables [13]. Finally, Jyothirmai et al., (2015) studied the role of INIT technique in subjects with upper trapezius trigger points. Thirty subjects were allocated randomly into two groups; group (1) received INIT with the strength program. Group (2) received INIT alone. Measures were VAS, CROM, and NDI. The consequences of this research indicated refinement in both groups [14].

It was reported that the role of KT in the management of MPS needs more randomized clinical trials to interpret its effect [19]. But, it has been supposed that KT may play its role by increasing blood supply and lymphatic fluid flow as a result of lifting effect that creates a wider space between the skin and the muscle [16], which may affect muscle functions [36]. Moreover, KT provides a positional stimulus to the skin, muscle and fascial structures and providing a proper afferent input to the central nervous system which in turn leads to a reduction of pain [37].

The consequences of this research are consistent with González- Iglesias et al., (2009) who exposed a significant refinement in pain intensity and CROM after applying KT for a short period in the cases of whiplash disorders [15]. Morerefinement in pain intensity and CROM after applying KT for a short period in the cases of whiplash disorders [15]. Moreover, Saavedra -Hernandez et al., (2012) showed that the subjects with mechanical neck pain that treated with KT alone or cervical thrust manipulation alone showed a decline in pain intensity and disability and improvement at active CROM, except for rotation [38]. Also, Marianaa and Carmen-Oana, (2014) compared the efficacy of KT and massage in subjects with mechanical triggered neck pain. This research involved two groups. One group treated with KT and the other group treated with relaxing massage. They measured pain, ROM, and NDI. The results exposed refinement in both groups but the superiority for KT [17].

Also, **Öztürk** et al., (2016) examined the short and midterm effects of KT on subjects with trigger points at the upper fiber of trapezius. Thirty-seven subjects were allocated by haphazard method into two groups. Group "A" received KT and group "B" received a sham KT. They measured VAS, pressure algometry before and after completion of the study and made follow up after one month. The consequences of this research shown improvement of VAS in both groups in favor of group A [18]. Lastly, Ay et al., (2017) studied the efficacy of KT and sham KT on pain, pressure pain threshold, CROM and NDI in cervical myofascial pain syndrome. Sixty-one subjects were assigned by the haphazard method to two groups. One group treated with KT and the other group treated with shame KT. At the end of this study, there was a significant refinement in pain, PPT, ROM, and disability index with superiority to KT. This study recommended that the KT is an effective procedure for treatment of myofascial pain syndrome [19].

In contrast, Thelen et al., (2008) presented the effectiveness of KT and shame KT on patients with rotator cuff tendinitis. The measurements were a function, VAS, and pain-free active ROM. They found that there was an improvement in ROM and no improvement in VAS and disability index in KT group [39].

The refinement in the control group may be attributed to the instructions that had been given to them to conserving the daily activity within the limit of pain and prevent them from doing hard work. This supported by Simons (2004), who directed that the most common cause for trigger points formation is muscle overload that leads to damage of motor endplate and increases production of acetylcholine causing the formation of muscle knot. So, when the subjects follow the instruction, the possibility for trigger points formation may be decreased [40]. In the same line Huguenin, (2004) stated that the long-term relief of myofascial triggers points pain must involve attention of all perpetuating factors that may lead to shortening of the muscle and formation of trigger points [29].

Limitations: No follow-up and no matching between male and female.

Conclusion: INIT and KT are effective methods in the management of subjects with active trigger points with superiority for INIT.

Conflict of interest: None

REFERENCES

[1] Shah JP, Danoff JV, Desai MJ, Nakamura LY, Phillips TM, Gerber LH, Parik S. Biochemical associated with pain and inflammation is elevated in sites near to and remote from active myofascial trigger points. Arch Physi Med Rehab. 2008; 89(1): 16-23.

[2] Shah JP, Thaker N, Heimur J, Aredo JV, Sikdar S, Gerber LH. Myofascial Trigger Points Then and Now: A Historical and Scientific Perspective. Am Acad Phys Med Rehabil. 2016; 7(7): 746-761.

[3] Simons DG. Travell JG. Simons LS. Travell & Simons' myofascial pain and dysfunction: The trigger point manual, Upper half of body. 2nd ed. Philadelphia: Lippincott Williams & Wilkins; 1999.

[4] Lee S, Chun SS, Lee S, Lin T, Chan R. Effects of needle electrical intramuscular stimulation on shoulder and cervical myofascial pain syndrome and microcirculation. Chin Med Assoc. 2008; 71(4): 200-206.

[5] Rickards LD. The effectiveness of non-invasive treatment for active MTrp pain: A systemic review of the literature. Int J Osteopath Med. 2006; 9(4):120-136.

[6] Cummings TM, White AR. Needling therapies in the management of myofascial trigger point pain: a systematic review. Arch Physi Med Rehab. 2001; 82 (7): 986-992.

[7] Chaitow L. Muscle energy techniques. 3rd ed. Edinburgh; 2006.

[8] Meseguer AA, Fernández-de-las-Peñas C, Navarro-Poza JL, Rodríguez -Blanco C, Boscá Gandia JJ. Immediate effects of the strain/counter strain technique in local pain evoked by tender points in the upper trapezius muscle. Clin Chiropract. 2006; 9(3): 112-118.

[9] Sibby M, Narasimman G, Vishal K. Effectiveness of Integrated Neuromuscular Inhibitory Technique and LASER with Stretching in the Treatment of Upper Trapezius Trigger Point. J Exer Sci Physiother. 2009; 5(2): 115-121.

[10] Amir I, Sohrap K, Mohd M. Efficacy of ischemic compression technique in combination with strain counter strain technique in managing upper trapezius myofascial trigger point pain. Indian J Physiother Occup Ther. 2010; 4(2): 10-15.

[11] Abdelfattah A, Kattabei O, Nasef S, Semaya A. Effect of kinesiotape in myofascial pain syndrome; Randomized Control Trial. The 4th European Congress of the ER-WCPT / Physiother**.** 2016**;** eS 140. POS-102.

[12] Amin DI. Spray stretch technique versus progressive pressure release on treatment of myofascial pain trigger point: randomized controlled trial. Int J Physiother Res. 2017; 5(3):2101-07.

[13] Nagrale AV, Glyn P, Joshi A, Ramteke G. The efficacy of an integrated neuromuscular inhibition technique on upper trapezius trigger points in subjects with

non-specific neck pain: a randomized controlled trial. J Man Manip Ther. 2010; 18(1): 37–43.
[14] Jyothirmai B, Senthil Kumar K, Raghavkrishna S, Madhavi K. Effectiveness Of Integrated Neuromuscular Inhibitory Technique (INIT) With Specific Strength Training Exercises In Subjects With Upper Trapezius Trigger Points. Int J Physiother. 2015; 2(5): 759-764.
[15] González-Iglesias J, Fernández-de-Las-Peñas C, Cleland JA, Huijbregts P, -Gutiérrez-Vega M. Short-term effects of cervical Kinesio taping on pain and cervical range of motion in patients with acute whiplash injury: a randomized clinical trial. J Orthop Sports Phys Ther. 2009; 39(7):515-521.
[16] Gomez-Soriano J, Abi´an-Vic´en J, Aparicio-Garc´ıa C, Ruiz-Lázaro P, Simón-Martínez C, Bravo-Esteban E, et al. The effects of Kinesio taping on muscle tone in healthy subjects: a double-blind, placebo-controlled crossover trial. Man Ther. 2014; 19(2): 131–136.
[17] Marianaa C, Carmen-Oana T. Massage versus Kinesio Taping. Possibilities to Enhance the Kinetic Program in Mechanically Triggered Neck Pain. Procedia Soc Behav Sci .2014; 117: 639 – 645.
[18] Öztürk G, Geler külcü DG, Mesci NG, Şilte AD. Efficacy of kinesiotape application on pain and muscle strength in patients with myofascial pain syndrome: a placebo-controlled trial. J Phys Ther Sci. 2016; 28(4): 1074–1079.
[19] Ay S, Konak HE, Evcik D, Kiba S. The effectiveness of Kinesio taping on pain and disability in cervical myofascial pain syndrome. Rev Bras Rheumatol. 2017; 57(2): 93-99.
[20] Osterman K, Schlenzka D, Poussa M, Seitsalo S, Virta L. Isthmic spondylolisthesis in symptomatic and asymptomatic subjects, epidemiology, and natural history with special reference to disk abnormality and mode of treatment. Clin Orthop Relate Res. 1993; 297: 65–70.
[21] Skargren EI, Oberg BE. Predictive factors for 1-year outcome of low-back and neck pain in patients treated in primary care: comparison between the treatment strategies chiropractic and physiotherapy. Pain. 1998; 77(2): 201–207.
[22] Fryer G, Hodgson L. The effect of manual pressure release on myofascial triggers points in the upper trapezius muscle. J Bodyw Mov Ther. 2005; 9(4): 248-255.
[23] Hsieh YL, Kao MJ, Kuan TS, Chen SM, Chen JT, Hong CZ. Dry needling to a key myofascial trigger point may reduce the irritability of satellite MTrPs. Am J Phys Med Rehabil. 2007; 86(5):397-403.
[24] Boonstra AM, Preuper HR , Reneman MF, Posthumus JB, Stewart R. Reliability and validity of visual analogue scale for disability in patients with chronic musculoskeletal pain. Int J Rehabil Res. 2008; 31(2): 165-9.
[25] Shaheen AM, Omar MT, Vernon H. Cross-cultural Adaptation, Reliability, and Validity of the Arabic Version of Neck Disability Index in Patients with Neck Pain. Pain. 2013; 38(10): 609-615.
[26] MacDermid JC, Walton DM, Avery S, Blanchard A, Etruw E, McAlpine C, et al. Measurement properties of the neck disability index: a systematic review. J Orthop Sports Phys Ther. 2009; 39(5): 400–417.
[27] Vernon H, Mior S. The Neck Disability Index: a study of reliability and validity. J Manipul Physiol Ther. 1991; 14(7): 409-415.
[28] Youdas JW, Carey JR, Garrett TR. Reliability of measurements of cervical spine range of motion-comparison of three methods. Phys Ther. 1991; 71(2): 98–106.
[29] Huguenin LK. Myofascial trigger points: the current evidence. Phys Ther Sport. 2004; 5(1):2–12.
[30] Gemmel H, Miller P, Nordstrom H. Immediate effect of ischaemic compression and trigger point pressure release on neck pain and upper trapezius trigger point: a randomized controlled trial. Clin Chiropract. 2008; 11(1): 30–36.
[31] Hidalgo-Lozano A, Fernandez -de-Las-Peñas C, Rodreguez LD, Gonzalez J, Palacios-Ceña D, Arroyo-Morales M. Changes in pain and pressure pain threshold after manual treatments of active trigger points in patients with unilateral shoulder impingement. J Bodyw Mov Ther. 2010; 15(4): 399-404.
[32] Nambi GS, Sharma R, Inbasekaran D, Vaghesiya A, Bhatt U. Difference in effect between ischemic compression and muscle energy technique on upper trapezius myofascial trigger points: Comparative study. Int J Health Allied. 2016; 2(1): 17-22.
[33] Lewis C, Souvlis T, Sterling M. Strain-Counterstrain therapy combined with exercise is not more effective than exercise alone on pain and disability in people with acute low back pain: a randomised trial. J Physiother. 2010; 57(2): 91–98.
[34] Wong CK, Moskovitz N, Fabillar R. The effect of strain counter strain (SCS) on forearm strength compared to sham positioning. Int J Osteopath Med. 2011; 14(3):86–95.
[35] Kumar G Y, Sneha P, Sivajyothi N. Effectiveness of Muscle energy technique, Ischaemic compression and Strain counterstrain on Upper Trapezius Trigger Points: A comparative study. Int J Phys Edu Sport Health. 2015; 1(3): 22-26.
[36] Gusella A, Bettuolo M, Contiero F,Volpe G. Kinesiologic taping and muscular activity: a myofascial hypothesis and a randomized, blinded trial on healthy individuals. J Bodyw Mov Ther. 2014; 18(3): 405–411.
[37] Kase K, Wallis J. The latest Kinesio taping method. Ski- Journal. 2002; 35.
[38] Saavedra-Hernández M, Castro-Sánchez AM, Arroyo-Morales M, Cleland JA, Lara-Palomo IC, Fernández-de-las-Peñas C. Short-Term Effects of Kinesio Taping Versus Cervical Thrust Manipulation in Patients with Mechanical Neck Pain: A Randomized Clinical Trial. J Orthop Sports Phys Ther. 2012; 42(8):724-730.

[39] Thelen M, DauberJ, Stoneman P. The clinical efficacy of Kinesio tape for shoulder pain: A randomized, double-blinded, clinical Trial. J Orthop Sports Phys Ther. 2008; 38(7):389-395.
[40] Simons DG. Clinical and etiological update of myofascial pain from trigger points. J Musculoskelet Pain. 2004; 4(1): 93-121.

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