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EFFECTIVENESS OF ISCHEMIC COMPRESSION ON TRAEZIUS MYOFASCIAL TRIGGER POINTS IN NECK PAIN

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ABSTRACT

Background: Neck pain is a common disorder prevailing among individuals of different populations. The myofascial pain syndrome is a disorder related to myofascial trigger points. It is defined as a hyperirritable locus in skeletal muscle and that is associated with a hypersensitive palpable nodule in a taut band of muscle. Manual therapy has got a profound role in treating and ischemic compression technique has been researched widely. Thus the study intends to analyse the effectiveness of Manual Therapy (Ischemic Compression) on functional outcome in neck pain.

Methods: A single blinded randomized control study was conducted for subjects of sample size 30 who met the inclusion criteria and random allocation was made. The baseline parameters as like pain severity using VAS, pain pressure threshold using pressure Algometer, active cervical lateral flexion using 360 degree goniometer and disability using NDI were recorded. Study group received ischemic compression followed by myofascial stretches while the control group received ultrasonic therapy of 1.4watts/cm2. Both received Cryotherapy post session. After 2 weeks the baseline parameters were again recorded for t-test analysis.

Result: There was no statistical significance between groups ($p \geq 0.05$). But active cervical lateral flexion showed improved mobility in study group and a high statistical significance within groups ($p \leq 0.01$) in relation to all parameters.

Conclusion: Both ultrasonic therapy and Ischemic compression technique was found to show better improvement in pain pressure threshold and functional outcome in neck pain.

Keywords: Myofascial trigger points, Trapezius muscle, Ischemic compression, Pressure Algometer, cervical lateral flexion and neck disability index

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INTRODUCTION

Neck pain is a common disorder prevailing among individuals of different population. Many factors influence the occurrence of neck pain, which vary from psychological, social and environmental factors. In many cases where the underlying pathology is not identified and treated with appropriate intervention yields poor outcomes, which may lead to chronic disorders. As a result, medical and socio economic cost are very high [1].

In the United States, in the year 2010, the Global Burden of Diseases was analyzed. Neck pain is ranked 4thmajor epidemic responsible for an individual's year lived with disability and ranked 11th as disability adjusted life years of an individual [2].

The estimated incidence of neck pain in one year time ranges from 10.4% to 23.3%. Prevalence ranges from 0.4% to 86.8%. Higher incidence is noted among office workers and computer users as well as women, particularly women of 35-49 age groups are more vulnerable to develop neck pain. Prevalence is also observed as high in women rather than men. While an estimated range of 33% to 65% of neck pain resolved within a year and most cases were reported to have relapsing of symptoms and run an episodic course in one's lifetime [3].

Among the contributing factors, the trigger points in Myofascial structures (MTPt) play an important role in myofascial pain syndromes. Pain features of commonly occurring idiopathic neck pain resembles the clinical features of referred pain which originate from muscle trigger points (TrPs). Certain scientific evidences support the role of muscle TrPs in chronic disorders of the neck and concluded that the neck syndrome pain may be triggered due to referred pain arising from TrPs in the posterior head, neck and shoulder muscles [4].

This myofascial pain syndrome clinically presents as referred pain, limitation in joint range of motion and a twitch response which is caused due to mechanical deformation of fascial and muscular areas known as myofascial trigger points (MTPts).A high percentage of muscular pain leads to myofascial pain syndromes [5, 6, 7, 8].

Myofascial trigger point is defined as a hyperirritable locus in skeletal muscle and that is associated with a hypersensitive palpable nodule in a taut band of muscle [7]. On compression, the point is tender and tends to refer to a distance termed as referred pain associated with motor dysfunctions. The types of myofascial trigger points include active, latent, primary, satellite, key and central [7].Active trigger point is distinguished from latent trigger point as MTP's that causes clinical pain symptom, which usually weakens the muscle and give raise to referred pain on compression within pain pressure tolerance. On the other hand latent MTPt's are those that are clinically dormant with regards to spontaneous pain and pains only on palpation. Latent MTPt's has similar characteristics of active MTPt's [7].

A myofascial trigger point that is closely associated with dysfunctional endplates is identified as central MTPt's. These central MTPt's are usually situated near the centre of muscle fibres. A key MTPt's are those that are responsible for activating one or more satellite MTPt's (7). A primary MTPt's defines itself as the central MTPt's that are apparently activated due to overload or due to overuse syndromes.

The factors influencing myofascial trigger points include micro trauma, macro trauma, overuse, physical stress and emotional stress. The patho-physiology of its origin is not clear and recent research suggests that there is less oxygen and nutrition in injured/overused muscle fibres leading to involuntary muscle contractions [9].

A clinical diagnostic criterion for identification of MTPt is localization of tender nodule in a taut band of muscle and subjective pain and tender spot palpation [10].The presence of active trigger points in posterior neck musculature is the most common finding in mechanical neck pain than healthy controls [4].

Certain misconceptions regarding the treatment of myofascial trigger points have been noted which includes:

1) Treating the trigger point alone will be sufficient.
2) Issues related to trigger point induced pain are largely psychogenic.
3) Myofascial pain syndromes can be cured on their own.
4) Treating the MTPt's and its pain relief rules out the visceral problems.

It is often noticed that non-specific or idiopathic neck pain arises from myofascial trigger points having the similar clinical picture of referred pain originating from MTPt's [7].Reviews reveal that levator scapulae muscle, Trapezius muscle and sub occipital muscles were the most prevalent locations for active MTPt's in neck pain individuals [11]. The extensive research suggests that upper Trapezius muscle is the most commonly involved muscle for myofascial trigger points (MTPt) [8, 12, 13, 14,15].

Involvement of the trapezius muscle leads to restriction of neck lateral flexion away from the involved side [7]. In a recent narrative review of physiotherapeutic treatment for myofascial trigger points concluded that the most used techniques for short term pain relief were trigger point pressure release, ischemic compression and dry needling [16].

Ischemic compression is the application of progressively strong, painful pressure on trigger point to eliminate trigger points [7]. On performing ischemic compression tissue attains recovery by reperfusion thereby relieving transient blood flow occlusion. Ischemic compression is performed by compressing the trigger points with tolerable pain intensity using thumb pressure or pressure algometer, and as the degree of pain decreases the intensity of compression is increased simultaneously. Ischemic compression should be followed by lengthening of muscle [7]. Recent evidences states that further research is required to prove the efficacy on ischemic compression [17] and duration of ischemic

compression is also questionable [18]. Hence the present study intends to analyse the effectiveness of ischemic compression on trapezius myofascial trigger points in subjects with neck pain.

MATERIALS AND METHODS

Subjects

Thirty subjects with non-specific neck pain of both genders from physiotherapy O.P.D were recruited. Further the inclusion criteria include subjects with active Trapezius myofascial trigger point with less than 3 months of duration. Patients with trauma and surgery around neck and shoulder, cervical myelopathy, congenital anomalies, motor weakness of upper limb and fibromyalgia were excluded for the study. Random allocation of patients into study (group 1) and control (group 2) were done.

Methods

Patients who meet the inclusion criteria were selected, the procedure was explained and an informed consent was obtained. Simple random sampling was used. Subjects were randomly allocated to control and study group. Base line parameters as like: Pain severity using Visual Analogue Scale which is a 10cm scale provided to the patient with two base references of "no pain" and "severe pain". The patient is asked to place a perpendicular line on the VAS scale that represents their pain intensity.

Pain Pressure Threshold using Pressure algometer for active triggers.Pressure algometry (PA) is a device that quantifies or assesses the pain pressure threshold (PPT). Quantifying PPT is an integral part and pressure algometry has been proven to be a useful instrument [19]. An algometer registers the force applied to a tissue in terms of kilograms per square centimetre. The recorded value is the pain pressure threshold i.e. the amount of force which reproduces pain [20].

Patient was positioned comfortably and the painful side and site were identified. The site was palpated to determine the presence of myofascial trigger points in upper trapezius. A trigger point is palpated as a tender spot on a taut band of muscles which produces comparable sign and jump sign. The palpated trigger points are marked with a skin marker. The patient is positioned accordingly and a dial type pressure algometer is placed on the site and a constant vertical pressure was applied to the site. The subject is instructed to express pain by raising their hands when only slight pain was felt, until then the pressure is increased at a constant rate. The procedure was repeated for three times with rest interval of five minutes between sessions.

Cervical lateral flexion is recorded using a 360 degree goniometry. Fulcrum of the goniometer is positioned at the vertex the movable arm in line with the subjects head while the immovable arm is in line with the midline of subjects back. Subject is instructed to tilt his head towards his left shoulder. The movable arm which is in a line with the head records the lateral flexion towards left. Same procedure is repeated on the right side.

The Neck Disability Index (NDI) is an outcome tool of ten descriptions which assess an individual's daily activities, pain and concentration in regards to their functional status. Each question carries six responses on a scale of 0-5 [21]. The maximum possible score is 50. Disability is calculated using the NDI raw score as no disability (0-4), mild (5-14), moderate (15-24), severe (25-34) and complete (<34).The Neck Disability Index (NDI) is the most widely used instrument in neck pain [22].

This questionnaire was provided to the patient and is asked to answer for the same. For the patients with language barrier the examiner explained the questions and the responses to patients.

Following the initial procedure of recording the baseline parameters, the patients were sent to the second examiner for the treatment. The baseline parameters were not revealed to the second examiner.

Control group received ultra-sonic therapy over the triggers of Trapezius muscle. Subjects were positioned in prone lying or sitting, there by relaxing the muscle. Each trigger point received 3 MHz ultrasound with 1.4 W/cm.Square and 5 minutes of duration [2].

Experimental group received Cryotherapy followed by Ischemic Compression. Patients were positioned in a forward lean sitting position support with pillow to relax the target muscle. Ischemic compression was performed by compressing trigger points in trapezius with tolerable intensity using thumb or pressure for the duration of 60 seconds for each trigger point.

Myofascial stretches for trapezius was performed. Based on patients comfort they were either positioned in supine lying or sitting. Trapezius myofascial were performed by depressing the affected side shoulder and side flexing the neck to normal side with a slight forward flexion. When the patient appreciated the stretch the position was maintained for 60 seconds hold duration and repeated thrice. Post therapy sessions, both groups received Cryotherapy.

Statistics

After 2 weeks of intervention the base line parameters was again evaluated by the first examiner and statistical analysis using t-test was performed. General characteristics such as age, gender, sidedness and total number of trigger points were analysed for mean and standard deviation.

RESULTS

Subject characteristics

Thirty subjects participated in this experimental study of which 11 were males and 19 females. In control group 7 females and 8 males, whereas in study group it was 12 females and 3 males. The average age of subjects in control group is 41.67± 12.57 and in study group is 42±10.91.In both groups the duration of symptoms of neck pain was less than 3 months. On analysing the sidedness of Trapezius muscle involvement, in control group 6 subjects reported right side and 9 reported left side, whereas in study group 8 subjects reported right side and 7 reported left

side involvement. The total numbers of trigger points located in upper trapezius were found to be almost similar in both groups (Control group - 5.06±0.96 and study group-5.06±1.10) (Table 1)

Table 1: General Characteristics of patients (n=30)

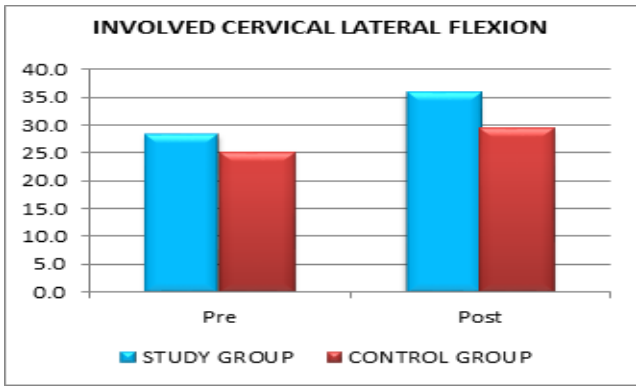
Characteristic	Group 1 (study)	Group 2 (control)
Age	42±10.908	41.6±12.56
Gender		
Male Female	3 12	8 7
Sidedness Right Left	 8 7	 6 9
No of trigger points	5.06±1.099	5.06±0.961

Table 2: Comparison of values between groups pre and post therapy

Baseline parameters	Group 1 Pre-therapy	Group 2 pre-Therapy	t- value	p-value	Group 1 Post-therapy	Group 2 Post-Therapy	t- value	p-value
Visual analogue scale	5.2±1.25	5.3±1.52	-0.288	0.775	3.1±1.45	3.9±1.66	-1.493	0.147
Pain pressure threshold	26.8±5.63	27.1±6.31	-0.153	0.880	33.2±6.38	32.3±8.26	0.346	0.732
Active cervical ROM*	28.4±7.98	25.0±6.02	1.291	0.207	35.6±5.60	29.4±7.85	2.516	0.018
Neck disability index	28.2±11.13	29.6±9.32	-0.373	0.712	13.0±6.44	16.8±9.14	-1.315	0.199

*involved side active cervical ROM-lateral flexion

Graph 1: Comparison of involved cervical lateral flexion between groups.



Graph 2: Comparison of Pain pressure threshold between groups.

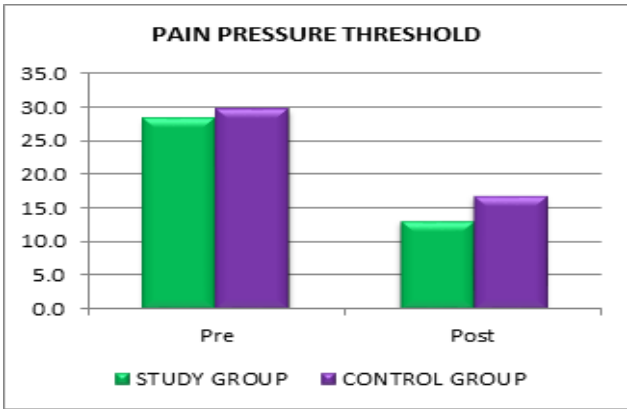
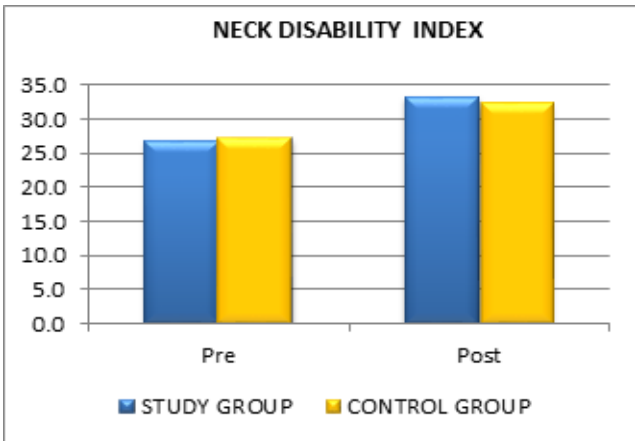


Table 3: Comparison of values within group pre and post therapy

	Visual analogue scale	Pain pressure threshold	Active cervical ROM*	Neck disability index
Group 1				
Pre-therapy	5.2±1.25	28.4±7.98	26.8±5.63	28.2±11.13
Post-therapy t-value p-value	3.1±1.45 7.194 0.000	35.6±5.60 -5.883 0.000	33.2±6.38 -4.495 0.001	13.0±6.44 6.999 0.000
Group 2				
Pre-therapy	5.3±1.52	25.0±6.02	27.1±6.31	29.6±9.32
Post-therapy t-value p-value	3.9±1.66 4.407 0.001	29.4±7.85 -5.173 0.000	32.3±8.26 -3.937 0.001	16.8±9.14 4.563 0.000

*involved side active cervical ROM-lateral flexion

Graph 3: Comparison of Neck disability index between groups.



Between group analysis

The mean VAS in study group is 5.2±1.25 and in control group is 5.3±1.52 with (p-0.775) before intervention. Prior to therapy, severity of neck pain was near similar in both groups. The mean VAS in study group is 3.1±1.45 and in control group is 3.9±1.66 after intervention. The results of pain severity between the groups were not statistically significant (p-0.147) but study group showed better improvement in terms of neck pain severity.

The mean cervical lateral flexion mobility in study group is 28.4±7.98 and in control group is 25.0±6.02 with (p-0.207) before intervention. The baseline mobility was better in study group than control group. The mean cervical lateral flexion mobility in study group is 28.4±7.98 and in control group is 25.0±6.02 with (p-0.207) after intervention. The baseline mobility was better in study group than control group.

The mean PPT in study group is 26.8±5.63and in control group is 27.1±6.31 with (p- 0.880) pre therapy. Prior to therapy, pain pressure threshold was near similar in both groups. The mean PPT in study group is 33.2±6.38 and in control group is 32.3±8.26 post therapy. The results of pain pressure threshold between the groups were not statistically significant (p-0.732) but study group showed better improvement of pain pressure threshold.

The mean NDI score in study group is 28.2±11.13 and in control group is 29.6±9.32 with (p- 0.712) before intervention. Prior to therapy, NDI score was near similar in both

groups. The mean NDI score in study group is 13.0±6.44 and in control group is 16.8±9.14 after intervention. The results of neck disability index between the groups were not statistically significant (p-0.0199) but the study group showed a better score of 3 points than the control group.

Within groups analysis

Study Group: The mean severity in study group before intervention is 5.2±1.25 and after intervention is 3.1±1.45 which is found to be statistically highly significant (p-0.000). The mean mobility in study group before intervention is 28.4±7.98 and after intervention is 35.6±5.60 which is statistically significant (p- 0.001). The mean PPT in study group before intervention is 26.8±5.63 and after intervention is 33.2±6.38, which is highly statistically significant (p- 0.000). The mean neck disability score in study group before intervention is 28.2±11.13 and after intervention is 13.0±6.44 which is statistically highly significant (p- 0.000).

Control Group: The mean severity in control group before intervention is 5.3±1.52 and after intervention is 3.9±1.66 which is statistically significant (p- 0.001). The mean mobility in control group before intervention is 25.0±6.02 and after intervention is 29.4±7.85 which is highly statistically significant (p- 0.000). The mean PPT in control group before intervention is 27.1±6.31and after intervention is 32.3.±8.26 which is statistically significant (p- 0.001). The mean neck disability score in control group before intervention is 29.6±9.32 and after intervention is 16.8±9.14 which is statistically significant (p- 0.000).

Overall on analysis of results reveals all outcomes are showing greater improvement when compared within groups, whereas the results are not statistically significant between groups. On comparing the mean differences, study group showed better improvement in terms of pain severity, active cervical lateral flexion mobility and pain pressure threshold and neck disability index.

DISSCUSSION

The presence of myofascial trigger points in upper Trapezius muscle is one among the classical finding in neck pain individuals. The most typical symptoms include a presence of taut band and hyperirritable tender spots within the muscle. Various treatment has been advocated namely trigger release, local injection, physical modalities, Cryotherapy, dry needling, ischemic compression and other manual methods. The present experimental study reveals the importance of manual methods, soft tissue mobilization in treating myofascial triggers in upper trapezius muscle.

In this study, from baseline values it was noticed that two parameters as like age (study group=42±10.908, control group=41.6±12.56) and total number of triggers in muscle (study group- 5.06±1.099, control group- 5.06±0.961) were matched in both groups. The side of involvement of the muscle was more over equal in both groups. This finding is not so specifically related to the dominance handedness of individuals.

The procedure of Ischemic compression causes local ischemia to muscle which is followed by reperfusion after the procedure is completed. Hence the duration of compression, compressive force, sustaining force are the variables which decides the effectiveness of procedure. In turn the role of physical modalities is also evident. Of all the physical modalities, ultrasonic therapy has at least the least evidence of effectiveness in musculoskeletal system. It works on the principle of stimulating and provoking tissues using ultrasonic waves.

In this current study, control group received only ultrasonic therapy in the triggers points for duration of five minutes per trigger point. Within group analysis revealed highly significant results with regards of cervical lateral flexion mobility and neck disability index (p-.000). Ultrasonic therapy is effective short term in stimulating segmental antinociceptors on trigger points was studied by Srbely in 2008 [23]. A very recent study by Manka in 2014 [24] concluded the superior effects of ultrasonic therapy in reducing pain and increasing muscle extensibility was also evident. Further in this study, each trigger point was treated for five minutes; the mean number of triggers measured is 5.06±0.961 in control group. So approximately, subjects received ultrasonic therapy for duration of 20 to 25 minutes. This result is similar to a recent study by Koca in 2014 [25] revealed high dosage and duration paved way for better improvement.

In study group, within group analysis reveals all outcomes of pain severity, pain pressure threshold and NDI were statistically highly significant (p-.000). It is clearly understood that always manual techniques are more advantageous than physical modalities as a care and competent touch can't be replaced by a machine. Ischemic compression, passive stretching of structures and myofascial release techniques are administered in study group. This combination of manual soft tissue techniques was also studied by kostopoulous in 2008 [26] with similar results. Various studies reported by Lake and Hanten [27, 28] proved the effectiveness of combination of techniques in myofascial trigger points.

The study results on comparing the two groups, there were no significant differences between them in all outcomes. Within group analysis showed highly significant results in pain severity, pain pressure threshold and NDI scores. The duration of treatment in both groups were found to be varied. The study group received 60 seconds of compression per trigger point accounting to 5-10 minutes, whereas control group received treatment for 20-25 minutes. Moreover, a study by Gulick [29] has suggested that Ischemic compression more than 30 seconds may not be required to produce effects. An optimal duration of 30 seconds is far enough to create ischemia and reperfusion.

The limitations of the study include a small sample size with less duration of follow up. Moreover, use of instrument to deliver ischemic compression as using index knobbler, pressure Algometer can be considered. Further large RCTs are required to establish the dosage of compression, use of

instrumentation and integrated soft tissue techniques.

CONCLUSION In conclusion, both ultrasonic therapy and Ischemic compression technique is found to show better improvement in pain pressure threshold and functional outcome in neck pain.

REFERENCES

[1] Boram Kang, Taikon Kim et al. Relief of chronic neck pain depending on the type of forest therapy: Comparison of the therapeutic effects of forest bathing alone versus forest bathing with exercise. Ann Rehabil Med. 2015 Dec; 39(6): 957-963.

[2] Christopher J. L Murray, Alan D. Lopez et al. Measuring the global burden of disease. Engl J Med. 2013; 369(5):448-457.

[3] Holy D G, Protani M et al. The epidemiology of neck pain. Best Pract Res Clin Rheumatol. 2010; 24(6): 783-92.

[4] C. Fernandez- de- las-Penas et al. Myofascial trigger points in subjects presenting with mechanical neck pain: A blinded, control study. Manual Therapy. 2007 Feb; vol 12 (1): 29-33.

[5] Ge H. Y, Nie H, Madeleine P et al. Contribution of the local and referred pain from active myofascial trigger points in fibromyalgia syndrome. Pain. 2009; 147(1–3):233–240.

[6] Harden R. N, Bruehl S. P et al. Signs and symptoms of the myofascial pain syndrome: a national survey of pain management providers. The Clinical Journal of Pain. 2000; 16(1):64–72.

[7] Simons D. G, Travell J. G, Simons L. S. Myofascial Pain and Dysfunction: The Trigger Point Manual. Volume 1. Baltimore, Md, USA: Lippincott Williams & Wilkins; 2005.

[8] Xu Y. M, Ge H. Y et al. Sustained nociceptive mechanical stimulation of latent myofascial trigger point induces central sensitization in healthy subjects. The Journal of Pain. 2010; 11(12):1348–1355.

[9] Albert F. Moraska et al. Changes in blood flow and cellular metabolism at a myofascial trigger point with trigger point release (ischemic compression): a proof – of- principle pilot study. Arch Phys Med Rehabil. 2013 Jan; 94(1):196-200.

[10] Fernandez-de-Las-Penas C, Simons D et al. The role of myofascial trigger points in musculoskeletal pain syndromes of the head and neck. Curr Pain Headache Rep. 2007 Oct; 11(5): 365-72.

[11] Lluch E, Nijs J, De Koonjng M et al. Prevalence, Incidence, Location, and Patho-physiology of myofascial Trigger Points in patients with spinal pain: A Systemic Literature Review. J Manipulative Physiol Ther. 2015 Oct; 38(8):587-600.

[12] BaeY. Change the myofascial pain and range of motion of the temporomandibular joint following kinesio taping of latent myofascial trigger points in the sternocleidomastoid muscle. Journal of Physical Therapy Science. 2014; 26(9):1321–1324.

[13] Tough E. A, White A. R, Richards S, Campbell J. Variability of criteria used to diagnose myofascial trigger point pain syndrome: evidence from a review of the literature. Clinical Journal of Pain. 2007; 23(3):278–286

[14] Castro-Sánchez A. M, Lara-Palomo I. C et al. Kinesio Taping reduces disability and pain slightly in chronic non-specific low back pain: a randomized trial. Journal of Physiotherapy. 2012; 58(2):89–95.

[15] Sarrafzadeh J, Ahmadi A et al. The effects of pressure release, phonophoresis of hydrocortisone, and ultrasound on upper trapezius latent myofascial trigger point. Archives of Physical Medicine and Rehabilitation. 2012; 93(1):72–77.

[16] Capo- Juan MA. Cervical myofascial pain syndrome. Narrative review of physiotherapeutic treatment. AnSistSanitNavar. 2015 Jan-Apr; 38(1):105-15.

[17] Cagnie B, Castelein B et al. Evidence for the use of ischemic compression and dry needling in management of trigger points of upper trapezius in patients with neck pain: A systemic Review. Am J Phys Med Rehabil. 2015 Jul; 94(7): 573-83.

[18] Soo A. Kim, Ki Young Oh et al. Ischemic compression after trigger point injection affect the treatment of Myofascial trigger points. Ann Rehabil Med. 2013 Aug; 37(4): 541-546.

[19] Fabio Antonaci et al. Pressure algometry in healthy subjects: inter-examiner variability. Scand J Rehabil Med. 1998 Mar;30(1):3-8.

[20] Ethne L Nussbaum, Laurie Downes. Reliability of Clinical Pressure-Pain Algometric Measurements 0btained on Consecutive Days. Phys Ther. 1998 Feb;78(2):160-9.

[21] Howard Vernon. The Neck Disability Index: state-of-the-art, 1991-2008. J Manipulative Physiol Ther. 2008 Sep; 31(7):491-502.

[22] Eda Tonga, Charles Philip Gabel et al. Cross-cultural adaptation, reliability and validity of the Turkish version of the spine functional index. Health Qual Life Outcome. 2015 Feb 27; 13:30.

[23] Srbely JZ, Dickey JP, Lowerison M et al. Stimulation of ultrasonic trigger points with ultrasound induces segmental antinoceptive effects: A randomised control study. Pain. 2008 Oct 15; 139(2): 260-6.

[24] Manca A, Limonta E et al. Ultrasound and laser as stand-alone therapies for myofascial trigger points: A randomized, double-blind, placebo-controlled study. PhysioTher Res Int. 2014 Sep; 19(3): 166-75.

[25] Koca I, Tutoglu A et al. A comparison of the effectiveness of low-, moderate- and high-dose ultrasound therapy applied in the treatment of myofascial pain syndrome. Mod Rheumatol. 2014 Jul; 24(4): 662-6.

[26] Kostopoulos D, Nelson AJ et al. Reduction of spontaneous electrical activity and pain perception of trigger points in the upper trapezius muscle. Journal of Musculoskeletal Pain. 2008;16(4): 266-278.

[27] Lake DA, Wright LL et al. The effectiveness of ischemic pressure and ischemic pressure combined with stretch on myofascial trigger points. J Orthop Sports Phys

Ther. 2009; 39: A70
[28] Hanten WP, Olson SL, Butts NL, Nowiccki AL. Effectiveness of home program of ischemic pressure followed by sustained stretch for treatment of myofascial trigger points. Phys Ther. 2008; 80: 997-1003.
[29] Dawn T. Gulick, Kerstin Palombaro, Lattanzi JB. Effect of ischemic pressure using a backnobbler II device on discomfort associated with myofascial trigger points. J Body Mov Ther. 2011; 15(3): 319-25.

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