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Effects of Ischemic Pressure Vesus Acupuncture Stimulation on Myofascial Neck Trigger Points

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Research Article

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Abstract

Neck pain is a common complaint that may contribute to substantial medical consumption and disability. The aim of this study was to investigate the effects of ischemic compression therapy and acupuncture stimulation on myofascial neck trigger points

Methods: 30 patients with myofascial neck trigger point were randomly assigned into group-A received ischemic compression treatment (ICT) on upper fibers of trapezius muscle and group-B received acupuncture point stimulation (dry needling) for upper fibers of trapezius muscle. In group (A) the (ICT) was applied three sessions a week for, while in group (B) the (dry needling) was applied three sessions a week.

Results: Pain pressure tolerability (PPT) (evaluated by Pressure Algometer), neck pain and function were evaluated by neck disability (NDI), cervical range of motions (CROMs) were evaluated by Digital Water Level, isometric muscle strength by hand held dynamometer and evaluation of trigger points by ultrasonic before and immediately after the treatment and one week after the study. At the end of the study; both groups showed a significant improvement (P-value <0.05) in all evaluated measures except in muscle strength there was no improvement, there was no significant difference between both groups at pre and post treatment ($p>0.05$).

Conclusion: Dry needling is significantly more effective than ischemic compression in improving pain pressure threshold, neck pain and disability, and Cervical ROMs in patients with CMNP.

Keywords: Neck Pain; Dry Needling, Ischemic Compression; Disability; Range of motion

Abbreviations: ICT: Ischemic Compression Treatment; PPT: Pain Pressure Tolerability; NDI: Neck Disability; CROMS: Cervical Range of Motions; MPS: Myofascial Pain Syndrome; MMT: Manual Muscle Test

System; MTRPS: Myofascial Trigger Points; LTRS: Local Twitching Response; ROM: Range of Motion; MPR Manual Pressure Release.

Introduction

The International Association for the Study of Pain defines neck pain as: "Pain perceived as arising from anywhere within the region bounded superiorly by superior nuchal line, inferior by an unoriginally transverse line through the tip of first thoracic spinous process, and laterally by sagittal plane tangential to the lateral border of neck [1].

The annual prevalence of nonspecific neck pain is estimated to range between 30% and 50 [2]. Persistent or recurrent neck pain continues to be reported by 50% to 85% of patients 1 to 5 years after initial onset [3]. Its course is usually episodic, and complete recovery is uncommon for most patients [4].

Neck pain is a common musculoskeletal complaint with a point prevalence around 15% in males and 23% in females [5].

Neck pain is one of the major musculoskeletal disorders in the adult population [6] its prevalence in the world ranges from 16.7% to 75.1% [5]. This condition has a complex etiology, including a number of factors: ergonomic (strenuous physical activity, use of force and vibration, inadequate posture, repetitive movement), individual (age, body mass index, genome, musculoskeletal pain history), behavioral (smoking and level of physical activity), and psychosocial (job satisfaction, stress level, anxiety, and depression [7,8].

Despite its high prevalence, the etiology of neck pain remains poorly understood and it is often difficult for the clinician to make a precise pathological diagnosis [9]. Neck pain can be a source of disability and may require substantial health care resources and treatments [10].

Among the common causes of neck pain is the myofascial pain syndrome (MPS), which has been found in nearly one third of the patients complaining of musculoskeletal pain disorders [11].

Myofascial pain has a high prevalence among individuals with regional pain complaints. The prevalence varies from 21% of patients seen in a general orthopedic clinic, to 30% of general medical clinic patients with regional pain, to as high as 85% to 93% of patients presenting to specialty pain management centers [12].

MPS is directly and causally related to soft tissue injury or secondarily related to biomechanical adaptation to injury. There have been several proposed mechanisms for the development Of MPS. Including fatigue, local ischemia, release of peptides after sustained muscle overload or repetitive strain injury, de conditioning, atrophic changes, dysfunctional biomechanical habits, functional loss, an abnormal neuromuscular junction possessing a lower activation threshold due to an energy deficit for recovery of calcium, and nociceptor sensitization, either peripheral or central [13].

The trigger point restricts motion of the muscles and decreases circulation, depriving the muscle of nutrients and oxygen and resulting in a collection of metabolic waste that cannot filtered away. These wastes excite pain nerve endings and can also damage them. The decrease of nutrients to the muscle increase spasm and inflammation [14].

Pain elicited by muscle TrPs constitutes a separate and independent cause of acute and especially chronic pain that may compound the symptoms of other conditions and persist long after the original initiating condition has been resolved. TrPs are also associated with visceral conditions and dysfunctions, including endometriosis, interstitial cystitis, irritable bowel syndrome, dysmenorrhea and prostatitis [15]. The presence of abdominal TrPs was 90% predictive of endometriosis [15].

There are different treatment approaches for MTrPs. Traditional treatment includes oral medications (such as muscle relaxants), thermal modalities, and massage [11,16,17].

Myofascial TPs can be eliminated through one of several modalities, including trigger-point injection, stretch and spray, dry needling (acupuncture), massage, trigger point pressure release, exercise, and pharmacologic agents.

The TPs pressure release is based on the technique of ischemic compression and can provide effective pain relief. The clinician uses palpatory pressure on each myofascial TP, until a state of tension relief is reached and, thus, inactivates the TP.

Needle-based interventions have also been used for MTrPs. These include acupuncture point stimulation, and trigger point injection (TPIs). Interestingly, direct needling has been found to exhibit a direct effect that is independent from the injected substance of TrPs.

Materials and Methods

Subjects

This study was conducted in the outpatient clinic of Elkasr Eleiny Cairo University, Egypt. Thirty subjects would be assigned randomly by ceiled envelop into two matched groups (A and B). Group A (ischemic pressure): was consisted of 15 patients receiving dry acupuncture point stimulation therapy Group B (acupuncture point stimulation): was consisted of 15 patients receiving ischemic pressure on trapezius muscle trigger points in patients with chronic mechanical neck pain. All patients fulfilled the inclusion criteria of the study and had no exclusion criteria. This study was carried out according to the principles of the Declaration of Helsinki 1975, revised Hong Kong 1989 and was approved by the corresponding department council and ethics committee.

Inclusive Criteria

Patient age ranges from 25 to 40 years old, Mechanical neck pain over the last 6 weeks that has been diagnosed by a physician oranorthopedist, Presence of MTrPs in the neck and upper trapezius, Reproduction of the patients pain complaints by palpation of MTrPs, Pain at the end of active ROM.

Exclusive Criteria

Patients diagnosed to have neck pain due to inflammatory diseases, patient with acute inflammatory diseases of musculoskeletal system, Pathology or structural deformities of the neck, Patients with radicular symptoms (radiating pain, loss of sensation, muscle dysfunction, or loss of reflexes), disc prolapse, severe scoliosis, spondyloarthrosis, previous neck surgery, other specific and serious causes of neck pain, significant or unstable cardiac, vascular or psychological problems. All patients were initially aware about and fully understand the purpose and procedures of the study and so an informed consent was obtained from each patient; giving agreement to participation and publication of the results of the study. All patients received the same medical care and education during the study and were asked to maintain their regular diet, normal daily activities and lifestyle throughout the study.

Randomization

Patients were randomly assigned into two groups through two stages by a person who did not share any other part of the study. First; eligible patients who fulfilled the inclusion criteria were initially recorded. Secondly; all reported patients were randomly assigned to either group-A (n=15; received ICT) or group-B (n=15; received dry needling therapy) through random number generation using an online random permutation generator from http://www.randomization.com.

Consent Form

Before starting the assessment and treatment procedures there was a consent form admitted to the patients in both groups in order to give the patients information about assessment and treatment procedures and each patient signed on the form of his own (Appendix I).

Duration of the Study

The study was done in a week of sessions in the form three sessions a week for group A ischemic pressure a week, and three time of dry needling for group B.

Instrumentations

The following instruments were used for evaluation:
Pressure algometer: Pressure algometer consists of a rubber disk with 1 cm2 surface. The rubber disk is connected to a pressure pole, which inserts into a gauge that records pressure in kilograms (kg) (Somedic, Sales AB, Farsta, Sweden). Pressure measurements are expressed in kg/cm2. The device would be used to assess the pressure pain threshold (PPT) on the tender points.

Pressure algometry is a reliable measure of pain in muscle, joints, tendons, and ligaments. The (Somedic, Sales AB, Farsta, Sweden) proves the benefits of applied medication, physiotherapy or manipulation. As treatment progresses, the (Somedic, Sales AB, Farsta, Sweden) quantifies improvements or setbacks. Pain threshold measurements provide unique information not obtainable by any other method. The objective measurements give reassurance to patients by confirming improvement. Takala, et al.; Levoska, et al. reported an intra-examiner reliability of pressure algometer that ranges from 0.6 to 0.97, and an inter-examiner reliability ranging from 0.4 to 0.98 [18,19].

Dynamometer: Lafayette manual muscle test system (MMT) model 01163 USA is a hand-held device for

objectively quantifying muscle strength. The Lafayette (MMT) readily lends itself to large, pre-participation screenings or field examinations. The microprocessor control allows for storage of calibration values and automatic drift compensation, resulting in reliable, accurate and stable muscle strength reading (manual of Lafayette manual muscle test system).

Functional disability: Functional disability of each patient would be assessed by the neck disability index. It was a valid and reliable tool [20]. It is consisted of 10 multiple choice questions for neck pain. Patient selects one sentence out of six that best describes his/her pain with higher scores indicating greater pain than lower scores, appendix 2.

Total scores ranges from 0 (highest level of function) to 50 (lowest level of function), and "percentage of disability" scores are calculable [21].

Digital water level: The (Professional 9 inches multi-function HUSKY digital level (HUSK, 2455 Paces Ferry Rd, Atlanta, GA 30339, USA). is a digital level (Figure 1) that is used as a manual leveling tool. It used to measure the horizontal and vertical alignment of objects, with a measuring range of 360 degrees. The accuracy of the fluid vials is ±0.029º for level, while the accuracy of the digital display is ± 0.1 º for level and ± 0.2 º for all angles. It has many advantages such as [22].

1. Zero degrees can be fixed to the plane of interest while testing.
2. No bony landmark is needed as a reference landmark.
3. Examiner needs only one free hand to obtain the measurement.
4. Digital display is more easily read and the measurement can be saved at the obtained end range of motion.

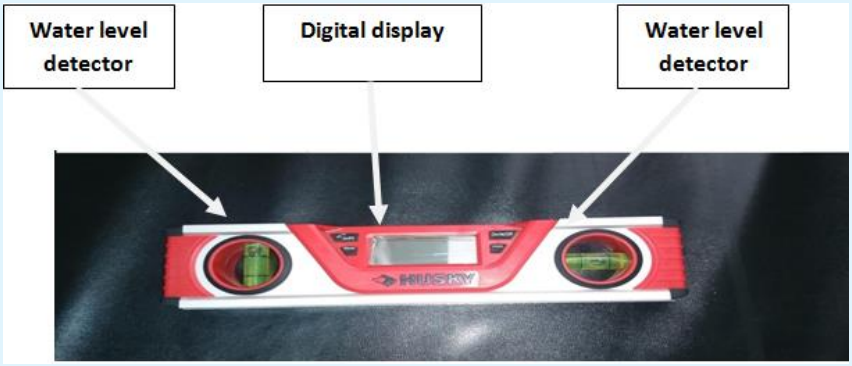

Figure 1: digital level (adapted from HUSK, 2455 Paces Ferry Rd, Atlanta, GA 30339, USA).

Acupuncture like needle (Long somatic needle): Long Somatic Needles will be used as a treatment tool (Wujiang City, Shenlong medical health products co, Ltd, jiangsur.P.R, China)

Procedures

First, personal information and history of each subject were collected and compared to the inclusion and exclusion criteria of the current study. Then, patients would be informed and receive a full oral explanation of the purpose and procedures of the current study before they would be asked to sign an informed consent form.

Assessment will be done before the beginning of treatment, immediately after the treatment, one week after the treatment.

Assessment procedures

Assessment of the myofascial trigger points (MTrPs): TrP assessment was performed by firstly identifying the taut band, by pincer or snapping palpation, then by firm digital pressure onto different points of the band itself. The TrP within the band was revealed by a jump sign reaction by the subject towards this pressure and by elicitation of a local twitch response (LTR) by snapping palpation. An active TrP was revealed by the occurrence of referred in addition to local pain. The patient was simply invited to report the kind of sensation felt upon TrP compression and its location. No solicitation regarding the referral of pain was made by the investigator.

Subjects would be asked to undress adequately to expose their shoulder and trapezius regions and lie

supine on a treatment table. With the subject supine and the therapist seated at the head of the table, the examiner will use his right thumb to palpate the muscle using flat palpation in order to figure out if there is any MTrPs present. Patient feedback will be documented with regard to local and referred pain during the examination [23,24]. Patient feedback was documented with regard to local and referred pain during the examination [24].

Functional disability: Functional disability of each patient will be assessed by neck disability index (appendix 1). The total score of each patient will be calculated. A score of 10-28 % will be considered mild disability, 30-48% moderate, 50- 68 % severe and 72% or more is complete (Vernon and Mior, 1991).

Measurement of pain pressure threshold (PPT): The therapist explained to each subject that they would feel a gradual increase in pressure on the skin. At the beginning of each testing session, the patient would be reminded that the PPT was defined as the "instant or moment that the pressure on the skin surface changed from the sensation of pressure to the sensation/perception of pain." The pressure would continue to increase until the patient would feel a sensory transition from pressure to pain and the therapist would record values of pressure that the patient can tolerate, three trials would be done and the mean would be taken. The subject would never view the recorded values [25]

Assessment of Local Twitching Response (LTRs): The therapist will apply snapping palpation by the thumb and forefinger across the taut band of an active MTrPs, there is often a detectable contraction of it. This local twitch can be visible if the muscle is superficial, or may be felt by the therapist. The LTR is more frequently encountered when directly acupuncture point stimulation the MTrPs. Also it will be viewed by ultrasound.

Evaluation of Cervical Spine Range of Motion (ROM) using the digital Water level: Cervical spine ROM was measured before starting the treatment (pretreatment) and immediately after the treatment (post treatment) and one week after the treatment. Every cervical range of motion measured for three times then the mean of three times was taken.

Measuring neck flexion and extension ROM
Position of the patient:
Measuring neck flexion ROM in the cervical spine
Position of the patient:

The patient was seated with backrest in a relaxed position with the head fixed in the mid position and the water level placed on a leveled hard ring on the vertex to measure cervical flexion and extension range of motion [26].

Measuring neck right lateral flexion and left lateral flexion ROM
Position of the patient:

The patient was seated with backrest in a relaxed position with the head fixed in the mid position and the water level placed on hard leveled ring on the vertex to measure cervical right and left lateral flexion range of motion [26].

Treatment Procedures

Patients would receive two sessions per week for a period of one week. The patient's expectations, questions, and goals would be discussed at the beginning of the treatment.

Acupuncture point stimulation: A fine gauge acupuncture needle would be inserted by the certified researcher into the MTrPs and manipulated until several LTRs are elicited. Direct mechanical stimulation through acupuncture point stimulation may induce connective tissue remodeling and plasticity to interrupt the pathogenic mechanism of MTrPs.

Acupuncture point stimulation involves multiple advances of an acupuncture-type needle into the muscle in the region of a trigger point, aiming to reproduce the patient's symptoms, visualize local twitch responses, and achieve relief of muscle tension and pain [27-29].

Ischemic pressure release (Manual Pressure Release; MPR): The patient would be encouraged to relax as much as possible before pressure is applied. Then, the therapist will apply a slow pressure to the MTrPs until the subject reports a 'moderate but easily tolerable' pain. If the subject reported that the pain is decreasing, at that moment, the pressure was maintained until the discomfort and/or pain eased by around 50%, perceived by the own patient, at which time pressure was increased until discomfort appeared again. This process was repeated for 60 s to 90 s [23]. This technique is claimed to be more effective when executed with the muscle in a lengthened position [30].

Ischemic Compression Group: The researcher applied gradual pressure on upper trapezius muscle latent MTrP. Subjects had been previously asked to say when pain was

"moderate but bearable" corresponding to a level 7 in a 1 to10 level scale of pain (1, no pain; 10, unbearable pain). At this point, pressure was maintained until pain levels were reduced to level 3. The researcher increased once more the pressure until the level of pain was 7 again. This procedure was repeated during 90 seconds.

Statistical Analysis

The outcome measures are include pressure pain threshold, neck range of motion, muscle morphology and peak muscle strength.

- Descriptive statistics and t-test was conducted for comparison of the subject characteristics and NDI between both groups.
- Mixed MANOVA was conducted to compare the effect of time (pre versus post) and the effect of treatment (between groups), as well as the interaction between time and treatment on mean values of neck ROM, strength, and PPT.
- The level of significance for all statistical tests was set at $p < 0.05$.
- All statistical measures were performed through the statistical package for social studies (SPSS) version 22 for windows.

Results

Demographic Data of Patients

A total of 30 male and female patients participated in this study. They were randomly assigned into two groups' experimental group (A) and experimental group (B).

Statistical Analysis

All data were examined using SPSS version 16.0. Data were collected and statistically analyzed using pre and post study T-test to test hypothesis and to control both within and between variables. Results were reported as means and standard deviations. For all procedures, significance was accepted at the alpha level of < 0.05.

Data obtained from groups pre, immediately post treatment and 1-week post treatment regarding neck ROM, muscle force and pain pressure threshold (PPT) and neck disability index were statistically analyzed and compared.

General characteristics of the subjects

Group A: Fifteen patients (6 males and 9 females) were included in this group. Their mean ± SD age, weight, height and BMI were 33 ± 5.23 years, 82.66 ± 6.14 kg, 164 ± 5.85 cm and 30.83 ± 3.15 kg/m^2 respectively as shown in table 1.

Group B: Fifteen patients (5 males and 10 females) were included in this group. Their mean ± SD age, weight, height and BMI were 34 ± 4.62 years, 79.46 ± 7.95 kg, 162.9 ± 5.42 cm and 30.03 ± 3.61 kg/m^2 respectively as shown in table 1.

Comparing the general characteristics of the subjects of both groups revealed that there was no significance difference between both groups in the mean age, weight, height, or BMI ($p > 0.05$) (Table 1).

	Group A $\bar{x}$ ± SD	Group B $\bar{x}$ ± SD	MD	t- value	p-value	Sign
Age (years)	33 ± 5.23	34 ± 4.62	-1	-0.55	0.58	**NS**
Weight (kg)	82.66 ± 6.14	79.46 ± 7.95	3.2	1.23	0.22	**NS**
Height (cm)	164 ± 5.85	162.9 ± 5.42	1.1	0.53	0.59	**NS**
BMI (kg/m^2)	30.83 ± 3.15	30.03 ± 3.61	0.8	0.64	0.52	**NS**

$\bar{x}$: mean ; SD: Standard deviation; MD: mean differenc; t value: Unpaired t value; p value: Probability value; NS: Non significant

Table 1: Descriptive statistics and t-test for comparing the mean age, weight, height and BMI of group A and B.

Effect of Treatment on Neck ROM, Muscle Force and PPT

Mixed MANOVA was conducted to investigate the effect of treatment on pain pressure threshold, NDI, cervical ROM and muscle force. There was no significant interaction effect of treatment and time ($p = 0.056$). There was no significant main effect of treatment ($p = 0.86$). There was a significant main effect time ($p = 0.0001$) (Table 2).

Mixed MANOVA	
Interaction effect (treatment * time)	
F = 2..75	p = 0.056
Effect of treatment (group effect)	
F = 0.49	p = 0.86
Effect of time	
F = 30.45	p = 0.0001

Table 2: Mixed MANOVA for the effect of treatment on pain pressure threshold, NDI cervical ROM and muscle force.

Effect of treatment on flexion ROM

Group A: The mean ± SD flexion ROM of group A at pre treatment was 14.5 ± 3.09 degrees, and immediately post treatment was 14.73 ± 3.07 degrees, and at 1 week post treatment was 14.7 ± 3.04 degrees (Table 3, Figure 2).

The mean difference in flexion ROM between pre and immediate post treatment was -0.23 degrees and the percent of change was 1.58%. There was no significant difference in flexion ROM between pre and immediate post treatment (p = 0.14). The mean difference in flexion ROM between pre and 1-week post treatment was -0.2 degrees and the percent of change was 1.37%. There was no significant difference in flexion ROM between pre and 1-week post treatment (p = 1). The mean difference in flexion ROM between immediate and 1-week post treatment was 0.03 degrees and the percent of change was 0.2%. There was no significant difference in flexion ROM between immediate and 1-week post treatment (p = 1) (Table 4).

Flexion ROM (degrees)						
Group A $\bar{x}$ ± SD			Group B $\bar{x}$ ± SD			
Pre treatment	Immediate post treatment	1-week post treatment	Pre treatment	Immediate post treatment	1-week post treatment	
14.5 ± 3.09	14.73 ± 3.07	14.7 ± 3.04	14.48 ± 3.45	15.06 ± 3.44	20.8 ± 4.32	
Within group comparison						
			MD	% of change	p-value	Sig
Group A	Pre vs. immediate post treatment		-0.23	1.58	0.14	NS
	Pre vs. 1-week post treatment		-0.2	1.37	1	NS
	Immediate vs. 1-week post treatment		0.03	0.2	1	NS
Group B	Pre vs. immediate post treatment		-0.58	4	0.0001	S
	Pre vs. 1-week post treatment		-6.32	43.64	0.0001	S
	Immediate vs. 1-week post treatment		-5.74	38.11	0.0001	S
Between group comparison						
A vs B			MD		p-value	Sig
	Pre treatment		0.02		0.99	NS
	Immediate post treatment		-0.33		0.78	NS
	1-week post treatment		-6.1		0.0001	S

$\bar{x}$: mean ; SD: Standard deviation; MD: mean difference; p value: Probability value; S: significant; NS: Non significant.

Table 3: Mean Flexion ROM at pre treatment, immediate post treatment and 1 week post treatment of group A and B.

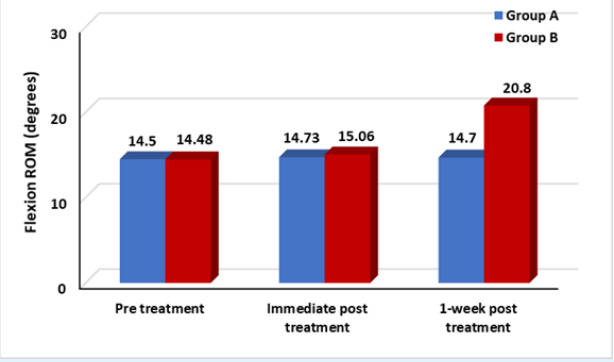

Figure 2: Mean flexion ROM at pre treatment, immediate post treatment and 1 week post treatment of both groups (A and B).

Group B: The mean ± SD flexion ROM of group B at pre treatment was 14.48 ± 3.45 degrees, and immediately post treatment was 15.06 ± 3.44 degrees, while at 1 week post treatment was 20.8 ± 4.32 degrees (Table 3, Figure 2).

The mean difference in flexion ROM between pre and immediate post treatment was -0.58 degrees and the percent of change was 4%. There was a significant increase in flexion ROM immediately post treatment compared with that pre treatment (p = 0.0001). The mean difference in flexion ROM between pre and 1-week post treatment was -6.32 degrees and the percent of change was 43.64%. There was a significant increase in flexion ROM at 1-week post treatment compared with that at pre treatment (p = 0.0001). The mean difference in flexion ROM between immediate and 1-week post treatment was -5.74 degrees and the percent of change was 38.11%. There was a significant increase in flexion ROM at 1-week post treatment compared with that immediately post treatment (p = 0.0001) (Table 3).

Comparison between groups: Multiple pair wise comparisons showed that there was no significant difference in the mean values of flexion ROM at pre treatment and immediately post treatment between group A and B (p < 0.05). However, there was a significant increase in flexion ROM of group B compared with that of group A at 1-week post treatment (p = 0.0001) (Table 3)

Effect of treatment on extension ROM

Group A: The mean ± SD extension ROM of group A at pre treatment was 15.32 ± 2.22 degrees, and immediately post treatment was 15.43 ± 2.23 degrees, and at 1 week post treatment was 15.55 ± 2.16 degrees (Table 4, Figure 3).

Extension ROM (degrees)						
Group A $\bar{x}$ ± SD			Group B $\bar{x}$ ± SD			
Pre treatment	Immediate post treatment	1-week post treatment	Pre treatment	Immediate post treatment	1-week post treatment	
15.32 ± 2.22	15.43 ± 2.23	15.55 ± 2.16	14.16 ± 2.38	14.61 ± 2.25	22.87 ± 3.82	
Within group comparison						
			MD	% of change	p-value	Sig
Group A	Pre vs. immediate post treatment		-0.11	0.71	0.34	NS
	Pre vs. 1-week post treatment		-0.23	1.5	1	NS
	Immediate vs. 1-week post treatment		-0.12	0.77	1	NS
Group B	Pre vs. immediate post treatment		-0.45	3.17	0.0001	S
	Pre vs. 1-week post treatment		-8.71	61.51	0.0001	S
	Immediate vs. 1-week post treatment		-8.26	56.53	0.0001	S
Between group comparison						
A vs B			MD		p-value	Sig
	Pre treatment		1.16		0.18	NS
	Immediate post treatment		0.82		0.32	NS
	1-week post treatment		-7.32		0.0001	S

$\bar{x}$: mean ; SD: Standard deviation; MD: mean difference; p value: Probability value; S: Significant; NS: Non significant.

Table 4: Mean extension ROM at pre treatment, immediate post treatment and 1 week post treatment of group A and B.

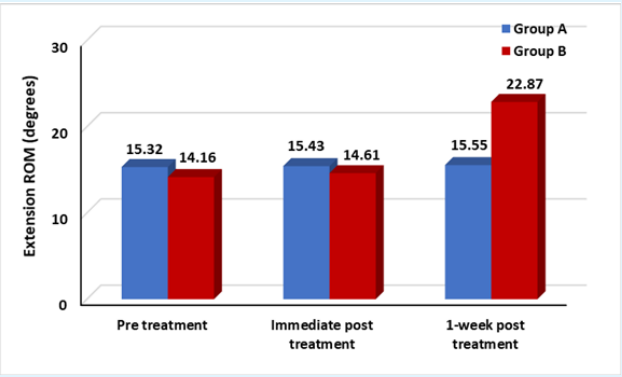

Figure 3: Mean extension ROM at pre treatment, immediate post treatment and 1 week post treatment of both groups (A and B).

The mean difference in extension ROM between pre and immediate post treatment was -0.11 degrees and the percent of change was 0.71%. There was no significant difference in extension ROM between pre and immediate post treatment ($p = 0.34$). The mean difference in extension ROM between pre and 1-week post treatment was -0.23 degrees and the percent of change was 1.5%. There was no significant difference in extension ROM between pre and 1-week post treatment ($p = 1$). The mean difference in extension ROM between immediate and 1-week post treatment was -0.12 degrees and the percent of change was 0.77%. There was no significant difference in extension ROM between immediate and 1-week post treatment ($p = 1$) (Table 4).

Group B

The mean ± SD extension ROM of group B at pre treatment was 14.16 ± 2.38 degrees, and immediately post treatment was 14.61 ± 2.25 degrees, while at 1 week post treatment was 22.87 ± 3.82 degrees (Table 4, Figure 3).

The mean difference in extension ROM between pre and immediate post treatment was -0.45 degrees and the percent of change was 3.17%. There was a significant increase in extension ROM immediately post treatment compared with that pre treatment ($p = 0.0001$). The mean difference in extension ROM between pre and 1-week post treatment was -8.71 degrees and the percent of change was 61.51%. There was a significant increase in extension ROM at 1-week post treatment compared with that at pre treatment ($p = 0.0001$). The mean difference in extension ROM between immediate and 1-week post treatment was -8.26 degrees and the percent of change was 56.53%. There was a significant increase in extension ROM at 1-week post treatment compared with that immediately post treatment ($p = 0.0001$) (Table 4).

Comparison between groups

Multiple pair wise comparisons showed that there was no significant difference in the mean values of extension ROM at pre treatment and immediately post treatment between group A and B ($p < 0.05$). However, there was a significant increase in extension ROM of group B compared with that of group A at 1-week post treatment ($p = 0.0001$) (Table 4).

Effect of treatment on right bending ROM

Group A: The mean ± SD right bending ROM of group A at pre treatment was 14.8 ± 2.69 degrees, and immediately post treatment was 14.91 ± 2.57 degrees, and at 1 week post treatment was 14.94 ± 2.66 degrees (Table 5).

The mean difference in right bending ROM between pre and immediate post treatment was -0.11 degrees and the percent of change was 0.74%. There was no significant difference in right bending ROM between pre and immediate post treatment ($p = 0.1$). The mean difference in right bending ROM between pre and 1-week post treatment was -0.14 degrees and the percent of change was 0.94%. There was no significant difference in right bending ROM between pre and 1-week post treatment ($p = 1$). The mean difference in right bending ROM between immediate and 1-week post treatment was -0.03 degrees and the percent of change was 0.2%. There was no significant difference in right bending ROM between immediate and 1-week post treatment ($p = 1$) (Table 5).

Group B: The mean ± SD right bending ROM of group B at pre treatment was 13.57 ± 2.98 degrees, and immediately post treatment was 14.14 ± 2.79 degrees, while at 1 week post treatment was 25.1 ± 3.38 degrees (Table 5).

The mean difference in right bending ROM between pre and immediate post treatment was -0.57 degrees and the percent of change was 4.2%. There was a significant increase in right bending ROM immediately post treatment compared with that pre treatment ($p = 0.0001$). The mean difference in right bending ROM between pre and 1-week post treatment was -11.53 degrees and the percent of change was 84.96%. There was a significant increase in right bending ROM at 1-week post treatment compared with that at pre treatment ($p = 0.0001$). The mean difference in right bending ROM between immediate and 1-week post treatment was -10.96 degrees and the percent of change was 77.51%. There was a

significant increase in right bending ROM at 1-week post treatment compared with that immediately post treatment (p = 0.0001) (Table 5).

Comparison between groups

Multiple pair wise comparisons showed that there was no significant difference in the mean values of right bending ROM at pre treatment and immediately post treatment between group A and B (p < 0.05). However, there was a significant increase in right bending ROM of group B compared with that of group A at 1-week post treatment (p = 0.0001) (Table 5).

Right bending ROM (degrees)						
Group A $\bar{x}$ ± SD			Group B $\bar{x}$ ± SD			
Pre treatment	Immediate post treatment	1-week post treatment	Pre treatment	Immediate post treatment	1-week post treatment	
14.8 ± 2.69	14.91 ± 2.57	14.94 ± 2.66	13.57 ± 2.98	14.14 ± 2.79	25.1 ± 3.38	
Within group comparison						
			MD	% of change	p-value	Sig
Group A	Pre vs. immediate post treatment		-0.11	0.74	0.34	NS
	Pre vs. 1-week post treatment		-0.14	0.94	1	NS
	Immediate vs. 1-week post treatment		-0.03	0.2	1	NS
Group B	Pre vs. immediate post treatment		-0.57	4.2	0.0001	S
	Pre vs. 1-week post treatment		-11.53	84.96	0.0001	S
	Immediate vs. 1-week post treatment		-10.96	77.51	0.0001	S
Between group comparison						
A vs B			MD		p-value	Sig
	Pre treatment		1.23		0.24	NS
	Immediate post treatment		0.77		0.43	NS
	1-week post treatment		-10.16		0.0001	S

$\bar{x}$: mean ; SD: Standard deviation; MD: mean difference; p value: Probability value; S: Significant; NS: Non significant

Table 5: Mean right bending ROM at pre treatment, immediate post treatment and 1 week post treatment of group A and B.

Effect of treatment on left bending ROM

Group A: The mean ± SD left bending ROM of group A at pre treatment was 13.02 ± 2.84 degrees, and immediately post treatment was 13.86 ± 2.79 degrees, and at 1 week post treatment was 13.92 ± 2.78 degrees (Table 6).

The mean difference in left bending ROM between pre and immediate post treatment was -0.84 degrees and the percent of change was 6.45%. There was no significant difference in left bending ROM between pre and immediate post treatment (p = 0.1). The mean difference in left bending ROM between pre and 1-week post treatment was -0.9 degrees and the percent of change was 6.91%. There was no significant difference in left bending ROM between pre and 1-week post treatment (p = 1). The mean difference in left bending ROM between immediate and 1-week post treatment was -0.06 degrees and the percent of change was 0.43%. There was no significant difference in left bending ROM between immediate and 1-week post treatment (p = 1) (Table 6).

Group B

The mean ± SD left bending ROM of group B at pre treatment was 13.49 ± 2.07 degrees, and immediately post treatment was 14.88 ± 2.19 degrees, while at 1 week post treatment was 23.26 ± 1.66 degrees (Table 6).

The mean difference in left bending ROM between pre and immediate post treatment was -1.39 degrees and the percent of change was 10.3%. There was a significant increase in left bending ROM immediately post treatment compared with that pre treatment (p = 0.0001). The mean difference in left bending ROM between pre and 1-week post treatment was -9.77 degrees and the percent of change was 72.43%. There was a significant increase in left bending ROM at 1-week post treatment compared

with that at pre treatment (p = 0.0001). The mean difference in left bending ROM between immediate and 1-week post treatment was -8.38 degrees and the percent of change was 56.31%. There was a significant increase in left bending ROM at 1-week post treatment compared with that immediately post treatment (p = 0.0001) (Table 6).

Comparison between groups

Multiple pair wise comparison showed that there was no significant difference in the mean values of left bending ROM at pre treatment and immediately post treatment between group A and B (p < 0.05). However, there was a significant increase in left bending ROM of group B compared with that of group A at 1-week post treatment (p = 0.0001) (Table 6).

Left bending ROM (degrees)						
Group A $\bar{x}$ ± SD			Group B $\bar{x}$ ± SD			
Pre treatment	Immediate post treatment	1-week post treatment	Pre treatment	Immediate post treatment	1-week post treatment	
13.02 ± 2.84	13.86 ± 2.79	13.92 ± 2.78	13.49 ± 2.07	14.88 ± 2.19	23.26 ± 1.66	
Within group comparison						
			MD	% of change	p-value	Sig
Group A	Pre vs. immediate post treatment		-0.84	6.45	0.34	NS
	Pre vs. 1-week post treatment		-0.9	6.91	1	NS
	Immediate vs. 1-week post treatment		-0.06	0.43	1	NS
Group B	Pre vs. immediate post treatment		-1.39	10.3	0.0001	S
	Pre vs. 1-week post treatment		-9.77	72.42	0.0001	S
	Immediate vs. 1-week post treatment		-8.38	56.31	0.0001	S
Between group comparison						
A vs B			MD		p-value	Sig
	Pre treatment		-0.47		0.24	NS
	Immediate post treatment		-1.02		0.43	NS
	1-week post treatment		-9.34		0.0001	S

$\bar{x}$: mean ; SD: Standard deviation; MD: mean difference; p value: Probability value; S: Significant; NS: Non significant
Table 6: Mean left bending ROM at pre treatment, immediate post treatment and 1 week post treatment of group A and B.

Effect of treatment on pressure pain threshold (PPT)

Group A: The mean ± SD PPT of group A at pre treatment was 3.56 ± 0.7 kg, and immediately post treatment was 3.64 ± 0.63 kg, and at 1 week post treatment was 3.94 ± 0.55 kg (Table 7).

The mean difference in PPT between pre and immediate post treatment was -0.08 kg and the percent of change was 2.24%. There was no significant difference in PPT between pre and immediate post treatment (p = 94). The mean difference in PPT between pre and 1-week post treatment was -0.38 kg and the percent of change was 10.67%. There was a significant increase in PPT at 1-week post treatment compared with that at pre treatment (p = 0.01).The mean difference in PPT between immediate and 1-week post treatment was -0.3 kg and the percent of change was 8.24%. There was a significant increase in PPT at 1-week post treatment compared with that immediately post treatment (p = 0.02) (Table 7).

Group B: The mean ± SD PPT of group B at pre treatment was 3.59 ± 0.53 kg, and immediately post treatment was 3.93 ± 0.72 kg, while at 1 week post treatment was 3.95 ± 0.71 kg (Table 7).

The mean difference in PPT between pre and immediate post treatment was -0.34 kg and the percent of change was 9.47%. There was a significant increase in

PPT immediately post treatment compared with that at pre treatment (p = 0.0001). The mean difference in PPT between pre and 1-week post treatment was -0.36 kg and the percent of change was 10.02%. There was a significant increase in PPT at 1-week post treatment compared with that at pre treatment (p = 0.01). The mean difference in PPT between immediate and 1-week post treatment was -0.02 kg and the percent of change was 0.5%. There was no significant difference in PPT between immediate and 1-week post treatment (p = 1) (Table 7).

Comparison between groups

Multiple pair wise comparison showed that there was no significant difference in the mean values of PPT at pre treatment, immediately post treatment and at 1-week post treatment between group A and B (p < 0.05) (Table 7).

PPT (kg)						
Group A ± SD			Group B ± SD			
Pre treatment	Immediate post treatment	1-week post treatment	Pre treatment	Immediate post treatment	1-week post treatment	
3.56 ± 0.7	3.64 ± 0.63	3.94 ± 0.55	3.59 ± 0.53	3.93 ± 0.72	3.95 ± 0.71	
Within group comparison						
			MD	% of change	p-value	Sig
Group A	Pre vs. immediate post treatment		-0.08	2.24	0.94	NS
	Pre vs. 1-week post treatment		-0.38	10.67	0.01	S
	Immediate vs. 1-week post treatment		-0.3	8.24	0.02	S
Group B	Pre vs. immediate post treatment		-0.34	9.47	0.0001	S
	Pre vs. 1-week post treatment		-0.36	10.02	0.01	S
	Immediate vs. 1-week post treatment		-0.02	0.5	1	NS
Between group comparison						
A vs B			MD		p-value	Sig
	Pre treatment		-0.03		0.9	NS
	Immediate post treatment		-0.29		0.24	NS
	1-week post treatment		-0.01		0.97	NS

$\bar{x}$: mean ; SD: Standard deviation; MD: mean difference; p value: Probability value; S: Significant; NS: Non significant
Table 7: Mean PPT at pre treatment, immediate post treatment and 1 week post treatment of group A and B.

Discussion

This study was designed to clarify the immediate effect of ischemic compression and dry needling therapy in treatment of trigger point in chronic mechanical neck pain. A comparison was held between 2 groups of chronic mechanical neck pain patients (A and B) group (A) received Ischemic Compression to trapezius and dry needling to group B. In our current study the dry needling has a significant results in increasing TPP of the trapezius muscle and cervical range of motion and this was consistent with Luis, et al. [31] who made a Systematic review of randomized controlled trials aiming to examine the effectiveness of dry needling in the treatment of myofascial trigger points and to explore the impact of specific aspects of the technique on its effectiveness. Relevant studies published between 2000 and 2015 were identified by searching PubMed, Scopus, The Cochrane Library and Physiotherapy Evidence Database. Studies identified by electronic searches were screened against a set of pre-defined inclusion criteria. The main outcomes that were measured were pain, range of motion, disability, depression and quality of life. The results suggest that dry needling is effective in the short term for pain relief, increase range of motion and improve quality of life when compared to no intervention/sham/placebo, There is insufficient evidence on its effect on disability, analgesic medication intake and sleep quality, despite some evidence for a positive effect in the short term, further randomized clinical trials of high methodological quality, using standardized procedures for the application of dry needling are needed.

on contrast to our study done systematic review with meta-analysis to determine the effect of dry needling in the treatment of MTrPs, Searches were performed using the electronic databases AMED, EBM reviews, Embase, and Ovid MEDLINE (all from database inception-February

2012), Randomized, Two blinded reviewers independently screened the articles, scored their methodological quality and extracted data, Physiotherapy Evidence controlled trials (RCTs) were included if they compared dry needling with another form of treatment or placebo and included pain intensity as an outcome Database (PEDro) quality scale and the Cochrane risk of bias tool were used, Four RCTs compared dry needling to lidocaine and one RCT compared dry needling to placebo, Meta-analyses of dry needling revealed no significant difference between dry needling and lidocaine immediately after treatment standardized mean difference (SMD) 0.41 (95%CI _0.15 to 0.97), at one month (SMD =1.46; 95% CI =2.04 to 4.96) and three to six months (SMD =0.28; 95% CI =0.63 to 0.07),Although not significant in the meta-analyses, there were interesting patterns favoring lidocaine immediately after treatment and dry needling at three to six months.

The randomized controlled trial done by Maryam, et al. [32] to investigate the effect of DN in the treatment of TrPs in the upper trapezius (UT) muscle. A sample of convenience of 33 patients with TrP in the UT muscle participated in this study, Patients were randomly assigned to a standard (N = 17) or experimental group (N = 16). The treatment protocol for the standard group consisted of trigger point compression technique (TCT) on MTP, while the patients in the experimental group received DN, Pain intensity and pressure pain thresholds were assessed for both groups before and after the treatment sessions, In addition, the Disability of Arm, Hand, and Shoulder (DASH) was administered. Statistical analysis (paired t-test) revealed a significant improvement in pain, PPT and DASH scores after treatment in the experimental (DN) and standard (TCT) group compared with before treatment ($P < 0.05$). The ANCOVA revealed significant differences between the DN and TCT groups on the post-measurement VAS score ($P = 0.01$), There was, however, no significant difference between the two groups on the post-measurement score of the PPT ($P = 0.08$) and DASH ($P = 0.34$), DN produces an improvement in pain intensity, PPT and DASH and may be prescribed for subjects with TrP in UT muscles especially when pain relief is then goal of the treatment.

The purpose of a study done by Barbara, et al. [33] was to determine the short-term effect of ischemic compression (IC) for trigger points (TPs) on muscle strength, mobility, pain sensitivity, and disability in office workers and the effect on disability and general pain at 6-month follow-up. Nineteen office workers with mild neck and shoulder complaints received 8 sessions of IC in which deep pressure was given on the 4 most painful TPs identified during examination. Outcome measures were general neck and shoulder complaints on a Numeric Rating Scale, Neck Disability Index (NDI), neck mobility (inclinometer), muscle strength (dynamometer), and pain sensitivity (Numeric Rating Scale and algometry). Subjects were tested at baseline (pre control), after a control period of no treatment of 4 weeks (post control), and after 4-week intervention training (post treatment). At 6-month follow-up, pain and disability were inquired. The results showed a statistically significant decrease in general neck/shoulder pain at post treatment ($P = .001$) and at 6-month follow-up ($P = .003$) compared with pre control and post control. There was no significant main effect for NDI scores. Pressure pain threshold increased at post treatment in all 4 treated TPs (P b .001). There was a significant increase in mobility and strength from pre control/post control to post treatment (P b .05).

Ce´sar, et al. [34] conducted pilot study to compare the effects of a single treatment of the ischemic compression technique with transverse friction massage for myofascial trigger point (MTrP) tenderness. Forty subjects, 17 men and 23 women, aged 19–38 years old, presenting with mechanical neck pain and diagnosed with MTrPs in the upper trapezius muscle, according to the diagnostic criteria described by Simons and by Gerwin, participated in this pilot study. Subjects were divided randomly into two groups: group A which was treated with the ischemic compression technique, and group B which was treated with a transverse friction massage. The outcome measures were the pressure pain threshold (PPT) in the MTrP, and a visual analogue scale assessing local pain evoked by a second application of 2.5 kg/cm2 of pressure on the MTrP. These outcomes were assessed pre-treatment and 2 min post-treatment by an assessor blinded to the treatment allocation of the subject. The results showed a significant improvement in the PPT ($P = 0:03$), and a significant decrease in the visual analogue scores ($P = 0:04$) within each group. No differences were found between the improvements in both groups ($P = 0:4$). Ischemic compression technique and transverse friction massage were equally effective in reducing tenderness in MTrPs. In another study conducted by Javier, et al. [35,36] to determine immediate effects of ischemic compression (IC) and ultrasound (US) for the treatment of myofascial trigger points (MTrPs) in the trapezius muscle, they assessed pain pressure tolerance by pressure algometer and active cervical range of motion by cervical range of motion instrument, the results of this study was on contrast of our study as the pain pressure tolerance decreased and cervical active range of motion increased,

Both groups improved functionally, but the group (A) showed significant improvement than the group (B), functional disability is assumed to be related to decreased mobility and increase pain severity associated with the condition. Increased mobility and pain reduction would, therefore, be expected to lead to functional improvement. In this study, both groups had an increase in mobility and a decrease of pain severity but group (A) showed significant improvement than the first one.

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