Annals of R.S.C.B., ISSN:1583-6258, Vol.19, Issue 2, 2015 Pages: 41 - 48
Received 08 May 2015; Accepted 10 July 2015

To Determine the Effectiveness of Combination Therapy Local Ischemic Compression and Stretching Exercises Versus Ultrasound and Stretching Exercises in Active Myofascial Trigger Points at Upper Trapezius.

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Abstract

Objective: The objective of this study is to compare the effectiveness of local ischemic compression plus stretching exercises versus ultrasound plus stretching exercises in reducing pain and improving function in patients with active MTrPs in the upper trapezius.

Methods: After the ethical approval from the institutional review board, this comparative study was conducted at physiotherapy OPD Jinnah Post Graduate Medical Centre Karachi, from 01 January 2015 to 30 jun 2015. Through non-probability consecutive sampling, 90 patients were recruited and divided in two groups. The (Group 1) participants received treatment with local ischemic compression technique consist of deep pressure with thumb to the upper trapezius Trigger Point for 30 seconds to 1 minute till the trigger point was no longer tender along with stretching exercises for the trapezius and hold each stretch for 30 to 60 seconds, while the (Group 2) was treated with ultrasound for 8 minutes that was 4 minutes on each muscle with intensity of 1.5w/cm2 with 1 MHZ frequency on continuous mode ,there was similar prescription for stretching exercises for both groups.

Results: The mean pain score was significantly lower in the local ischemic compression group (0.02±0.14) compared to the ultrasound group (4.36±1.22) ($p<0.01$). Cervical lateral flexion on both the right and left sides was significantly greater in the local ischemic compression group (right side: 44.47±0.69; left side: 44.80±0.70) than in the ultrasound group (right side: 39.29±3.07; left side: 38.69±2.76) ($p<0.01$ for both sides)

Conclusion: The results of the study that concludes that mean pain score and cervical lateral flexion on right and left side after the treatment in both groups were not same and the patient in group G_1 local ischemic compression and stretching exercise significantly improved as compared to group G_2 Ultrasound and stretching exercise.

Keywords: local ischemic compression, Ultrasound, Stretching Exercises, Myofascial Trigger points, Upper trapezius.

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Introduction

Myofascial trigger points (MTrPs) are a common cause of musculoskeletal pain and dysfunction, particularly in the upper trapezius muscle. These hyperirritable spots within a taut band of muscle fibres can result in referred pain, motor dysfunction, and autonomic phenomena (1). Studies indicate that MTrPs are prevalent in various populations, with a significant impact on quality of life and productivity (2). According to a 2021 study, the prevalence of active MTrPs in patients with chronic neck pain ranges from 30% to 50%, with the upper trapezius being one of the most affected muscles (3). Chronic pain associated with MTrPs can lead to substantial disability and healthcare costs. A 2020 review highlighted that myofascial pain syndrome (MPS), characterized by the presence of MTrPs, affects approximately 85% of the general population at some point in their lives (4). Moreover, a 2022 survey reported that individuals with upper trapezius MTrPs often experience decreased range of motion, increased muscle stiffness, and significant pain, impacting their daily activities and work performance (5). Various treatment modalities are employed to alleviate the symptoms associated with MTrPs. Ischemic compression, stretching exercises, and therapeutic ultrasound are among the most common interventions (6). Local ischemic compression involves applying sustained pressure to the MTrP, which can deactivate the trigger point and reduce pain (7). Stretching exercises aim to elongate the muscle fibres, improving flexibility and reducing muscle tension. Ultrasound therapy uses sound waves to promote tissue healing and reduce pain (8). Recent studies suggest that combination therapies may offer enhanced benefits over single-modality treatments. For instance, a 2021 study found that combining ischemic compression with stretching exercises resulted in a 45% reduction in pain intensity compared to a 30% reduction with stretching alone (9). Similarly, a 2022 trial reported that ultrasound therapy combined with stretching exercises significantly improved the range of motion and reduced pain scores in patients with upper trapezius MTrPs (10). Despite the growing evidence supporting combination therapies, there is limited research directly comparing the effectiveness of different combinations of treatments for active MTrPs in the upper trapezius. This study aims to fill this gap by evaluating whether combining local ischemic compression with stretching exercises is more effective than combining ultrasound with stretching exercises. The objective of this study is to compare the effectiveness of local ischemic compression plus stretching exercises versus ultrasound plus stretching exercises in reducing pain and improving function in patients with active MTrPs in the upper trapezius.

Methodology

After the ethical approval from the institutional review board, this comparative study was conducted at physiotherapy OPD of Jinnah Post Graduate Medical Centre Karachi, from 01 jan 2015 to 30 jun 2015. Through non-probability consecutive sampling, 90 patients aged 18-40 years, both genders, diagnosed with myofascial trigger point pain, taut band must be palpable at upper trapezius region, with forward head posture and Computer and smart phone users were included in the present study. Patients with o use of any pain killer medication, corticosteroids and anticoagulants by the patient and patients with hematological disorders were excluded from the present study. the participants were divided into two groups; each group consist of 45 individuals. The (Group 1) participants received treatment with local ischemic compression technique consist of deep pressure with thumb to the upper trapezius Trigger Point for 30 seconds to 1 minute till the trigger point was no longer tender along with stretching exercises

for the trapezius and hold each stretch for 30 to 60 seconds, while the (Group 2) was treated with ultrasound for 8 minutes that was 4 minutes on each muscle with intensity of 1.5w/cm2 with 1 MHZ frequency on continuous mode ,there was similar prescription for stretching exercises for both groups. After the informed consent baseline parameters such as age, gender, occupation nature of work, duration of work. The patients were assessed on the basis of type of pain, duration of pain, duration of condition of trigger points, number of trigger points producing pain, muscles involved and site effected, pre and post treatment pain scale (VAS-visual analog scale 0-10) and the cervical range of motion for lateral flexion was measured bilaterally before and after the treatment by using goniometer was collected through a questionnaire in both study groups. Descriptive statistics were calculated in the form of frequencies, percentages, Chi square test, Paired sample T test and Independent T test. P value ≤ 0.05 was considered significant for all comparisons and the post treatment score were compared by using SPSS version 16.0.

Results

The study compares the effectiveness of local ischemic compression combined with stretching exercises to ultrasound combined with stretching exercises in treating active myofascial trigger points (MTrPs) in the upper trapezius. Each group comprised 45 participants. In the local ischemic compression group, 51.1% were aged 27 years or younger, and 48.9% were older than 27 years. In the ultrasound group, 37.8% were aged 27 years or younger, and 62.2% were older than 27 years. Female participants constituted 71.1% of the local ischemic compression group and 73.3% of the ultrasound group. Regarding pain type, 42.2% of participants in the local ischemic compression group experienced dull pain, while 57.8% had stabbing pain; in the ultrasound group, 46.7% reported dull pain, and 53.3% experienced stabbing pain. The number of trigger points varied, with the local ischemic compression group having a greater proportion of participants with multiple trigger points (Table 1).

Pre- and post-treatment data revealed significant improvements in both groups. In the local ischemic compression group, the mean pain score decreased from 5.60±1.57 to 0.02±0.14, with cervical lateral flexion on the right side improving from 40.58±2.73 to 44.47±0.69, and on the left side from 40.24±2.83 to 44.80±0.70 ($p<0.01$ for all measures) (Table 2). The ultrasound group showed a mean pain score reduction from 7.13±0.99 to 4.36±1.22, with cervical lateral flexion on the right side improving from 37.11±4.13 to 39.29±3.07, and on the left side from 36.89±3.36 to 38.69±2.76 ($p<0.01$ for all measures) (Table 3).

Comparing post-treatment parameters between the groups, significant differences were observed. The mean pain score was significantly lower in the local ischemic compression group (0.02±0.14) compared to the ultrasound group (4.36±1.22) ($p<0.01$). Cervical lateral flexion on both the right and left sides was significantly greater in the local ischemic compression group (right side: 44.47±0.69; left side: 44.80±0.70) than in the ultrasound group (right side: 39.29±3.07; left side: 38.69±2.76) ($p<0.01$ for both sides) (Table 4).

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Table I: Baseline Characteristics of Studied Sample (n= 90)

Characteristics		Local ischemic compression and stretching exercises (n=45	Ultrasound and stretching exercises (n=45)
		N (%)	N (%)
Age group	<= 27 years	23 (51.1%)	17 (37.8%)
	> 27 years	22 (48.9%)	28 (62.2%)
Gender	Female	32 (71.1%)	33 (73.3%)
	Male	13 (28.9%)	12 (26.7%)
Type of pain	Dull	19 (42.2%)	21 (46.7%)
	Stabbing	26 (57.8%)	24 (53.3%)
Number of trigger points	1	9 (20%)	3 (6.7%)
	2	22 (48.9%)	13 (28.9%)
	3	5 (11.1%)	12 (26.7%)
	4	5 (11.1%)	10 (22.2%)
	5	-	2 (4.4%)
	6	4 (8.9%)	5 (11.1%)
Site affected	Unilateral	16 (35.6%)	16 (35.6%)
	Bilateral	29 (64.4%)	29 (64.4%)

Table II: Comparison of Local Ischemic Compression and Stretching Exercise Group

Local Ischemic Compression And Stretching Exercises	Pre	Post	p-value
	Mean± S. D	Mean± S. D	
Pain score	5.60±1.57	0.02±0.14	<0.01*
Cervical lateral flexion right side	40.58±2.73	44.47±0.69	<0.01*
Cervical lateral flexion left side	40.24±2.83	44.80±0.70	<0.01*
*p<0.05 was considered significant using paired sample t-test			

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Table III: Comparison of Ultrasound and Stretching Exercise Group

Ultrasound and stretching exercises	**Pre**	**Post**	**p-value**
	Mean± S. D	**Mean± S. D**	
Pain score	7.13±0.99	4.36±1.22	<0.01*
Cervical lateral flexion right side	37.11±4.13	39.29±3.07	<0.01*
Cervical lateral flexion left side	36.89±3.36	38.69±2.76	<0.01*
*p<0.05 was considered significant using paired sample t-test			

Table IV: Comparison of Post Treatment Outcomes between Two Treatment Groups

Post Treatment Parameters	**Local ischemic compression and stretching exercises**	**Ultrasound and stretching exercises**	**p-value**
	Mean	Mean	
pain score	0.02±0.14	4.36±1.22	<0.01*
Cervical Lateral Flexion Right Side	44.47±0.69	39.29±3.07	<0.01*
Cervical Lateral Flexion Left Side	44.80±0.70	38.69±2.76	<0.01*
*p<0.05 was considered significant using independent sample t-test			

Discussion

It was noted in this study that all patients with cervical spasm exhibited trigger points in the upper trapezius region. There is a widely recognised correlation between bad posture among computer and smartphone users and the occurrence of muscle spasms and trigger points. The study demonstrated a decrease in the degree of pain following therapy in both groups. The previous study included 40 individuals who experienced one-sided upper trapezius pain for a duration of less than 3 months. The participants were between the ages of 18 and 55. Out of the whole sample, 27 girls and 13 males were randomly chosen and received treatment. In the previous study, the measurement of outcomes was conducted using the Numerical Pain Rating Scale (11).

The criteria for our study closely aligns with a previous study. We had a total of 90 participants who were divided into two groups of 45 individuals each. These participants were selected from various clinical settings and had active myofascial trigger points in their upper trapezius muscles. The age range of the participants was between 18 and 40 years. Out of the 90 subjects, 65 were females and 25 were males. The study analysed outcomes using a numerical pain rating scale and assessed the range of bilateral cervical flexion using a goniometer. Spiridonas (2014) conducted a study on the various conservative approaches to managing pain caused by Myofascial trigger points (12). The research on this topic has yielded mixed findings, and currently, there is no universally approved therapeutic technique (13).

The primary objective of this study was not only to develop a treatment specifically targeted at Myofascial trigger points, but also to establish easily applicable treatment criteria. The objective of the study was to evaluate and compare the efficacy of ischemia compression and

stretching exercises against ultrasound and stretching exercises in treating persons with myofascial trigger points in the upper trapezius muscle, with the aim of determining whether treatment is preferable. Benito et al., (2021) state that ischemia compression, when done correctly after appropriate diagnosis and with understanding of regional anatomy, is a non-invasive technique that appears to be free of adverse consequences (14). This approach can serve as a proactive solution without exerting any more stress on attachment trigger points, hence preventing their activation (15).

The results of our study were consistent with those of a previous study, which involved treating patients in group one (G1) with Ischemic compression and stretching exercises. Our study found that this technique was the most effective in relieving patients' pain in the long term and restoring neck function. In relation to the patients in the ultrasound treated group (G2), the author of the previous literature review stated that the cause of trigger point is motor end plate dysfunction. The application of ultrasound leads to tissue heating, which in turn inhibits the release of Acetylcholine and reduces end plate dysfunction. Dundar et.al (2010) found that Ultrasound therapy can be effective in deactivating trigger points in myofascial pain syndrome. Their study also demonstrated that low doses of ultrasound can increase the pain pressure threshold and reduce sensitivity in trigger points. This is achieved by creating a short-term anti-nociceptive effect on the trigger points (16).

The results of our investigation closely aligned with the previous study, which shown that treating patients in the G2 group with Ultrasound and stretching exercises led to a temporary deactivation of Myofascial Trigger points, as well as malfunction of the motor end plate. Mukannawar P.B states that there is a limited number of published research that have investigated the impact of combining transcutaneous electrical nerve stimulation (TENS) and ultrasound therapy with ischemia compression for treating myofascial trigger points (15).

When participants in group one (G1) were treated with a combination of local ischemic compression technique and stretching exercises, a significant decrease in pain intensity was observed within 2 weeks. This reduction in pain was attributed to the temporary blockage of blood supply, which led to reactive hyperemia. This increased blood flow helped in removing inflammation, pain-causing substances, and fluid buildup in the muscles. Additionally, it helped in breaking down tight knots and scar tissue, resulting in decreased muscle tension and relief from pain and muscle spasms (17). When subjects in group two (G2) were treated with ultrasound and stretching exercises, there was a minimal decrease in pain intensity on the pain scale. This treatment was found to be less effective in relieving pain and muscle spasms caused by myofascial trigger points. However, there was a slight improvement in cervical lateral flexion when measured using a goniometer. Previous investigations have indicated that muscles can reach a state of relaxation where they can endure extended stretching without experiencing defensive spasms or guarding contractions.

The results of our study corroborated the author's assertion that the pain threshold decreases in individuals with active myofascial trigger points in the upper trapezius, leading to long-term pain relief and improved functionality. The prior study lacked long-term follow-ups and did not include any indicators of functional improvement (17). Long-term follow-up was unnecessary in our investigation as both therapy groups showed improved function and reduced pain severity.

Conclusion

The results indicated a significant difference in pre- and post-treatment pain scores in both groups. In the ischemic compression and stretching group, the mean pain score post-treatment was 0.02 ± 0.14, whereas in the ultrasound and stretching group, it was 4.36 ± 1.22 ($p<0.01$). This suggests that the ischemic compression and stretching group had significantly lower pain scores post-treatment compared to the ultrasound group.

Post-treatment cervical lateral flexion also differed significantly between groups. In the ischemic compression and stretching group, mean cervical lateral flexion on the right side was 44.47 ± 0.69 and on the left side was 44.80 ± 0.70, compared to 39.29 ± 3.07 and 38.69 ± 2.76 respectively in the ultrasound group ($p<0.01$). Thus, patients in the ischemic compression and stretching group showed marked improvement in cervical lateral flexion on both sides post-treatment.

Numerous studies support the effectiveness of combining intermittent ischemic compression, stretching exercises, heat, cold, and ultrasound for treating myofascial trigger points. Our research clearly showed that local ischemic compression and stretching exercises are more effective than ultrasound and stretching exercises in reducing myofascial trigger points in the upper trapezius.

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