



Original Research Article

## Comparative Study of Myofascial Release and Cold Pack in Upper Trapezius Spasm

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### ABSTRACT

**Background and objective:** Neck pain commonly seen in back of neck and between the bases of neck to shoulder mainly indicates the involvement of upper trapezius muscle. About two third of people will experience neck pain at some point in their lives. A considerable proportion of patients with upper trapezius spasm had been treated with medical and physical therapy interventions. The study aims to compare the effectiveness of Myofascial Release technique (MFR) versus Cold pack in relieving pain, improving cervical ROM and pressure pain threshold in upper trapezius spasm patients.

**Study design:** Comparative Cross sectional Study.

**Study setting:** Outpatient Orthopedic Physiotherapy department.

**Outcome Measures:** VAS, Pain Pressure Threshold (PPT), ROM

**Materials & Method:** 45 subjects with upper trapezius spasm were randomly assigned into 3 groups. Group A (n=15) underwent MFR + exercises, Group B (n=15) Cold pack + exercises and Group C (n=15) only exercises once daily for 5 days. The outcome measures were recorded at baseline and after 5 treatment session.

**Results:** Post treatment analysis suggests significant difference among groups ( $p < 0.05$ ). The MFR group shows greater significant improvement in VAS ( $p = 0.000$ ), PPT ( $p = 0.000$ ) and ROM ( $p = 0.000$ ) compared to cold pack and only exercises group.

**Conclusion:** The MFR and Cold pack along with exercises are effective interventions in upper trapezius muscle spasm. But MFR shows greater effectiveness as compared with cold pack and exercises in treatment of upper trapezius spasm.

**Key Words:** Myofascial release technique, Pressure pain threshold, Trapezitis.

### INTRODUCTION

Earlier anatomist referred to trapezius as a 'shawl' muscle or 'musculus calcularis' (shaped like a monk's hood) because of its shape and location. Low level activity of the upper trapezius is frequently

found during sitting and standing which is related to head posture and is a common source of tension and neck pain in people who work at a desk and computers or who spend many hours driving.<sup>[1]</sup> The upper trapezius is often placed in a shortened

position by poor ergonomics which creates shortness in the muscle. The trapezius is also activated by stressful thoughts and feeling or abnormal breathing pattern.

Neck pain is very common in the region of the upper trapezius muscle. About two thirds of people experience neck pain at some point in their lives. In middle age Prevalence is highest and women are more affected than men. Neck pain prevalence varies widely in different studies, with a mean point prevalence of 13 % (range 5.9% – 38.7 %) and mean lifetime prevalence of 50 % (range 14.2% – 71.0 %).<sup>[2]</sup>

Muscle spasm occurs early after injury. This feels like tightness in the muscles and is sometimes painful. When basic injury is not treated, spasm causes formation of muscle knots, called trigger points. The knots form because the spasm keeps the muscle continuously “on”. As muscles are not designed for this continuous work, over a period the muscle gets overloaded and forms these knots. As a result treatment of the spasm is necessary to reduce this problem. This happens most often with injuries to the neck and back.<sup>[3]</sup> The myofascial trigger point in the trapezius is most commonly found at the midpoint of the upper border of the muscle.

Trauma either acute or chronic causes sarcoplasmic reticulum of muscle to tear and release calcium. This calcium and ATP causes the sarcomere to contract, which shortens the muscle in a localized area producing taut bands. This generates high level of metabolic activity and ischemia in the area, thus releasing of substances that cause hyperirritability of sensory nerve endings and produce pain.<sup>[4,5]</sup>

Trigger points are typically located by palpation. Simons described criteria for identification of taut band - a tender spot on the taut band, referred pain or altered sensation at least 2 cm beyond the spot,

elicited by needle penetration or pressure held for 10 seconds; and restricted ROM in the joint, the muscle crosses.<sup>[6]</sup> The reliability of identifying TrPs with these criteria has been questioned.<sup>[7]</sup> Some authors<sup>[4, 6]</sup> contend that when pressure is applied to TrP, a “jump sign” is elicited or patient reacts with facial grimacing or verbal response.

An algometer is a useful tool to judge the pressure or force to elicit a pressure pain threshold.<sup>[8]</sup> A side to side difference exceeding 2 kg in comparison with normal values indicate pathologic tenderness. Measuring pain pressure threshold (PPT) as an index of TrP sensitivity using pressure algometer is a reliable technique, demonstrating high interrater and intrarater reliability.<sup>[9,10]</sup>

Various physiotherapy protocols have been advocated in the past like rest, heat, U.S., MWD, TENS,<sup>[11]</sup> spray and stretch, and post- isometric relaxation<sup>[12]</sup> in treatment of trapezius spasm.<sup>[13]</sup> These treatments give temporary relief. There are no supporting controlled studies in decreasing pain which arise from TrP.

Myofascial release is a soft tissue mobilization technique, defined as “the facilitation of mechanical, neural and psycho physiological adaptive potential as interfaced via the myofascial system.”<sup>[8]</sup> By MFR there is a change in the viscosity of the ground substance to a more fluid state which eliminates the fascia’s excessive pressure on the pain sensitive structure and restores proper alignment.<sup>[13]</sup> This technique acts as a catalyst in the reduction of trapezius spasm.

The use of cold or cryotherapy for medicinal purposes in the form of ice and snow has been used since the time of Hippocrates.<sup>[14]</sup> The application of ice in osteopathic is most commonly recommended for patients presenting with musculoskeletal injury.<sup>[15]</sup> Cryotherapy decreases tissue

blood flow by causing vasoconstriction, reduces tissue metabolism, oxygen utilization, inflammation and muscle spasm. Common methods of cold application are ice pack, vapo-coolant spray, ice massage, cold whirlpool.<sup>[16]</sup> By application of cold pack reduces temperature to a depth of 2 to 4 cm, which reduces activation of nociceptors and painful nerve conduction velocity.<sup>[17]</sup>

The interpretation of the study suggests that stretching the muscle after trigger point treatment is necessary to provide longer pain relief.<sup>[13]</sup> This has been part of therapy, to decrease TrP pain. The present study was undertaken with the intention to compare the effect of MFR and cold pack in patients with upper trapezius spasm.

## **MATERIALS AND METHODOLOGY**

The subjects from an institutional based Orthopedic and Sports Physiotherapy outpatient department referred by orthopedic consultant with neck pain were screened by a Therapist '1'. The included subjects were of age group 20-40 years, pain from last one month, limitation of neck movements due to pain, both male and female, jump sign characterized by patient vocalization or withdrawal,<sup>[19]</sup> palpable tender spot in the upper trapezius muscle. They were excluded if there is a history of referred pain due to cervical pathology, healing fractures over neck and upper back region, dermatitis over upper back, clotting disorders, wound over neck region, shoulder pathology, degenerative cervical spine.

45 subjects diagnosed as upper trapezitis who fulfilled the inclusion criteria after thorough physical objective evaluation and clinical reasoning process with provocation test of jump sign. Informed consent was obtained from all subjects. Demographic data were collected from the subjects (Table-1). Pre participation

evaluation form consisted of chief complaint, history, VAS, Pressure Pain Threshold and ROM of lateral bending of cervical spine to the opposite side using goniometry chart. Each subject was allowed to ask questions to the examiner regarding the study. Then the subject was asked to mark a visual analogue scale with the average pain intensity for their pain over past 24 hours. The subjects were then acquainted with the sensation of pressure algometer on an unaffected part of the body before testing for pressure pain threshold for primary trigger point. The pressure algometer was placed perpendicular to the area to be tested with the subject sitting in chair, increasing the pressure steadily at the rate of approximately 1 Kg/sec. Each subject was asked to point the most painful areas of the upper trapezius region and to determine the area of possible trigger points. Examiner then palpated the region of upper trapezius and marked all the trigger points that matched the inclusion criteria with a non permanent marker. Pressure pain threshold was measured for each marked trigger point in the same manner as in familiarization session. Then opposite side cervical side flexion range was measured using goniometer. Fulcrum of goniometer was placed on 7<sup>th</sup> cervical vertebra. The study obtained Ethical clearance from Institutional Review Board.

### ***Sampling technique:***

All 45 subjects were randomly assigned with concealed allocation to 1 of 3 treatment groups: Group-A (n=15) MFR + exercises (detailed below), Group-B (n=15) cold pack + exercises, Group - C (n= 15) exercises. A block randomization process was used, where subjects randomly chose 1 of 3 labelled envelopes to determine their group allocation. The next subject was then assigned to remaining group before the process was repeated.

### Interventions:

Therapists '2', '3' and '4' who were aware of group allocation, provided predefined treatment protocol to groups A, B and C accordingly for 5 consecutive days. The subjects were neither informed about treatment nor allowed to communicate with each other to provide blinding of subjects.

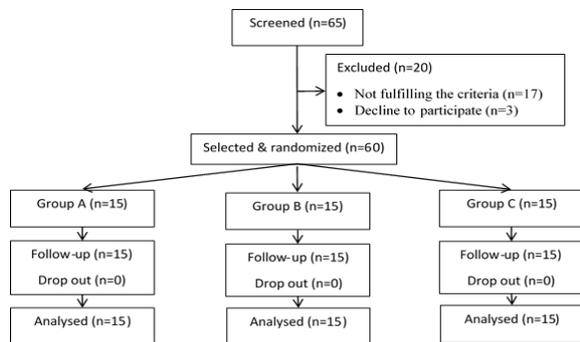


Figure 1: Sampling Flow Chart



Figure 2: Subject receiving deep transverse friction on upper trapezius.



Figure 3: Subject receiving MFR on upper trapezius.



Figure 4: Measuring pressure pain threshold in upper trapezius.

**Cold pack:** Cold pack was given over upper trapezius region in sitting position for 20 min.<sup>[18]</sup>

**Exercises:** Shoulder girdle exercises including scapular protraction, retraction, elevation and depression. Active Neck exercises including cervical flexion, extension, right and left rotation and side flexion. All exercises are given for 10 repetitions and 5 seconds hold.<sup>[19]</sup>

**Outcome measures:** The effectiveness of treatment was assessed by conducting three measurements. The subjective pain

### Myofascial Release

Deep transverse friction was given for 10 minutes followed by myofascial stretching of upper trapezius muscle for 3 times, each holding for 90 seconds. With the patient in comfortable sitting position on an armless chair and both feet firmly planted on the floor, gradual friction was applied to the primary trigger point using the right thumb with the left thumb reinforcing it from the top (Figure 2). Then myofascial release was given to the upper trapezius with using ulnar border of both palms of the therapist (Figure 3). At that time patient was in position of side flexion of cervical spine to opposite side.<sup>[19]</sup>

assessment was taken by visual analogue scale (VAS) which is reliable for disability in patients with chronic musculoskeletal pain.<sup>[20]</sup> Pressure pain threshold was assessed by pressure algometer (Figure 4) and ROM of upper trapezius muscle (lateral bending of cervical spine to the opposite side) by goniometer.<sup>[21]</sup> Physiotherapist 'A', who was blinded to group allocation, took all post treatment outcome measures at end of 5 sessions.

### Statistical analysis:

All statistical analysis was done using SPSS 16 for windows software. Normality of data was checked by using Shapiro-Wilk test in sigmaplot 11 for windows software. Among three groups VAS & ROM scores were following the normality test but PPT scores were not following normality test. The level of significant was set at  $p=0.05$ . Descriptive analysis was used to calculate mean and standard deviation. One way ANOVA was performed to assess the homogeneity in pre inter group and post inter group comparison in VAS and ROM scores and Kruskal-Wallis H test was performed for PPT scores among the groups. Paired-T test was performed for intragroup comparison in VAS and ROM scores and Wilcoxon paired test was performed for PPT scores.

## RESULTS

The groups were homogenous in their demographic details with  $p>0.05$  (Table 1). The pre-treatment VAS ( $p=0.549$ ),

PPT ( $p=0.894$ ) and ROM ( $p=0.769$ ) showed that there was no significant difference ( $p>0.05$ ) and proved the pre-treatment group homogeneity. Pre and post treatment comparison for VAS (Group-A:  $p=0.000$ , Group-B:  $p=0.000$ , Group-C:  $p=0.004$ ) (Table 2, Figure 5), PPT (Group-A:  $p=0.000$ , Group-B:  $p=0.066$ , Group-C:  $p=0.498$ ) (Table 2, Figure 6) and ROM (Group-A:  $p=0.000$ , Group-B:  $p=0.004$ , Group-C:  $p=0.017$ ) (Table 2, Figure 7) showed highly significant difference ( $p<0.05$ ) within the groups (Table-2). It indicated that both MFR and Cold pack were helpful in reducing pain in upper trapezitis patients. The post treatment inter group comparison of VAS ( $p=0.000$ ), PPT ( $p=0.000$ ) and ROM ( $p=0.000$ ) showed highly significant difference ( $p<0.05$ ) in the improvement between three groups (Table 3, Figure 5, 6, 7). MFR proved more significant improvement in VAS, PPT and ROM.

Table-1: Baseline Data.

Variable	Total (n=45)	Group A (n= 15)	Group B (n= 15)	Group C (n=15)	P value ( $>0.05$ )
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Age (year)	28.7(4.7)	29.86 (5.4)	28.40(4.6)	27.93(4.23)	0.519
Height(cm)	1.58(7.3)	1.57 (9.19)	1.57(5.65)	1.62(6.07)	0.145
Weight(kg)	60.88(12.5)	61.13(12.32)	58.40(10.64)	63.13(14.81)	0.596
BMI (kg/m <sup>2</sup> )	23.84(3.6)	24.50(3.11)	23.14(3.16)	23.89(4.53)	0.598
Gender	25-F, 20-M	6-M, 9-F	7-M, 8-F	7-M, 8-F	0.919
Side	D-27, ND-18	9-D, 6-ND	8-D, 7-ND	10-D, 5-ND	0.770
VAS	7.6(1.13)	7.86 (0.99)	7.46 (1.30)	7.4 (1.12)	0.549
PPT	0.8(0.21)	0.86(0.22)	0.9 (0.20)	0.8 (0.22)	0.894
ROM	24.4(5.69)	23.53 (4.53)	24.6 (6.11)	25 (6.54)	0.769

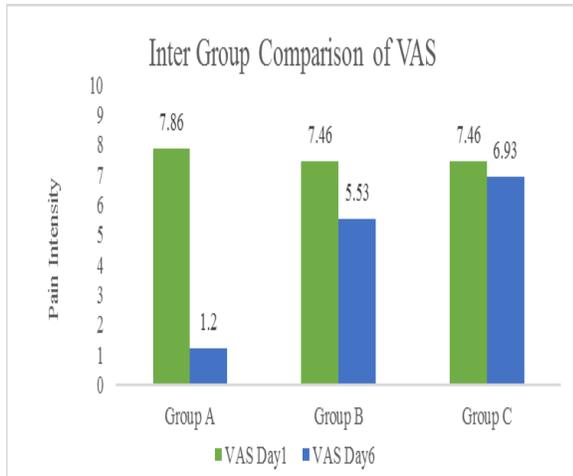
M=Male, F=Female, BMI=Body Mass Index, D=Dominant, ND=Nondominant

Table 2: Intra-group comparison of VAS, PPT and ROM.

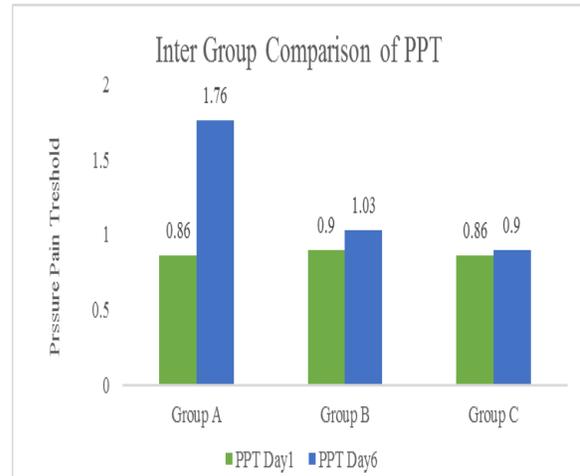
Group		VAS		PPT		ROM	
		Mean (SD)	p-value	Mean (SD)	p-value	Mean (SD)	p-value
A	Pre	7.86 (0.99)	0.000	0.86(0.22)	0.000	23.53 (4.53)	0.000
	Post	1.20(0.86)		1.76(0.41)		35.33 (5.16)	
B	Pre	7.46 (1.30)	0.000	0.9 (0.2)	0.066	24.6 (6.1)	0.004
	Post	5.53 (1.1)		1.0 (0.2)		27.4 (6.4)	
C	Pre	7.4 (1.12)	0.004	0.8 (0.22)	0.498	25 (6.5)	0.017
	Post	7.0 (1.06)		0.9 (0.20)		26.8 (6.61)	

**Table 3: Inter-Post treatment group comparison of VAS, PPT and ROM.**

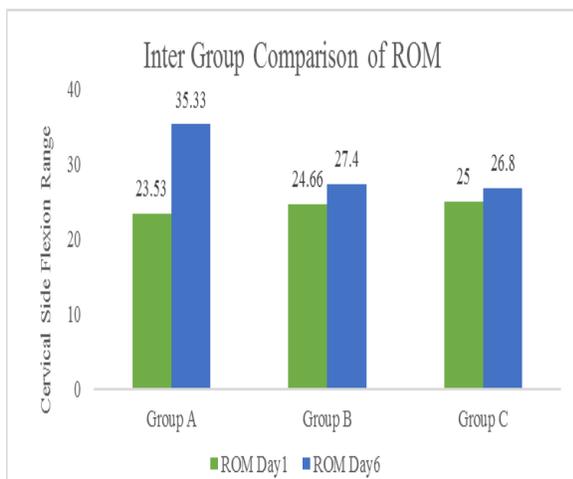
Outcome Measures	Group A Mean (SD)	Group B Mean (SD)	Group C Mean (SD)	p-value
VAS	1.20(0.86)	5.53 (1.1)	7.0 (1.06)	0.000
PPT	1.76(0.41)	1.0 (0.2)	0.9 (0.20)	
ROM	35.33 (5.16)	27.4 (6.4)	26.8 (6.61)	



**Figure 5: Inter group comparison of VAS.**



**Figure 6: Inter group comparison of PPT on upper trapezius muscle.**



**Figure 7: Inter group comparison of cervical opposite side flexion ROM.**

## DISCUSSION

This comparative study of 5 sessions of MFR and cold pack in combination with shoulder girdle exercises led to the findings that A, B & C treatments groups improved significantly in pain (VAS). But Only MFR was effective in improving pressure pain threshold and ROM for upper trapezius patients as compared to Cold pack and

exercises. After analysis of baseline data and post treatment scores, it reveals significant improvement ( $p < 0.05$ ) in group A after a 5 treatment session. There was significant difference ( $p < 0.05$ ) in post treatment comparison between MFR and cold pack group. The findings of this study suggested both MFR and cold pack along with shoulder girdle exercises were effective in the treatment of upper trapezititis.

The MFR group showed more effectiveness than cold pack in VAS, PPT and ROM score. When Myofascial Release is used on the TrPs, local chemistry changes due to blanching of the nodules followed by hyperaemia. This flushes out the muscle inflammatory exudates and pain metabolites, breaks down the scar tissue, desensitizes the nerve endings and reduces muscle tone.<sup>[22]</sup> Thus Myofascial Release has essentially the same mechanism of action on the trigger point as the injection therapy. However Myofascial Release is a non-invasive technique that does not produces post

treatment soreness or haemorrhage. Interpretation of literature suggests that stretching the muscle after trigger point treatment is necessary to provide longer pain relief.<sup>[4,12,13]</sup>

The results of this study may be applied to a population with a clinical diagnosis of insidious onset of upper trapezitis. The predominance of women (*Female-55.55%; Male-44.44%*), with dominant side (Dominant- 60%; NonDominant-40%), with middle age range participants in this study reflects the characteristics of population that is likely to experience upper trapezitis. Because of the short intervention and observation periods, one cannot infer that the positive effects of MFR and cold pack seen at 5<sup>th</sup> session of treatment will lead to prolonged improvements. Further controlled studies with longer observation are required to observe for long term improvement of symptoms.

## CONCLUSION

This study provided evidence to support the use of MFR and cold pack along with shoulder girdle exercises in the short-term management of upper trapezitis. MFR along with exercises was more effective than that of cold pack along with exercises and exercises alone in pain alleviation and improving pressure pain threshold and opposite side cervical side flexion ROM in patients with upper trapezitis because of stretching effect on muscle and stimulation of nociceptive endings connected to A- delta fibres.

### *Limitation of the study:*

- Inadequate literature supporting the use of cold pack
- The study had a small sample size.
- Ergonomical advices and posture correction not employed.

### *Scope for the further study:*

- Further long term study can be conducted for effectiveness of MFR and coldpack.
- Similar study could be used to establish the effectiveness of Myofascial Release on the spasm of other muscles.
- Myofascial release could be compared with other modalities.

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### *Conflict of interest:*

We declare that there were no conflicts of interest in the entire journey of the study.

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