Effect of Ischemic Compression Followed by Stretching on Myofascial Trigger Points

MENAKAM.P.T(Ortho)[*], K.KALAICHANDRAN M.O.T(Neuro)[**]

[*] Lecturer,Annamalai University
[**] MSc(Psy).,MSc(App psy),Senior Occcupational Therapist, RMMCH, Annamalai University (Former, Professor & Head, school of OT, Faculty of Health Science, Kuala Lumpur Metropolitan University (KLMU), Kuala Lumpur, Malaysia)

***Abstract*- Aim:** The aim of the study was to find out the efficacy of Ischemic compression followed by stretching on Myofascial trigger points.

Objectives: To find out the efficacy of Ischemic compression followed by stretching on myofascial trigger points.

Methods: 40 Subjects with active myofascial trigger points in trapezius were selected for this study. Pain intensity was assessed using **N**umerical **P**ain **R**ating **S**cale (**NPRS**) and Pressure Pain Threshold of trigger points by pressure algometer. This Experimental Study has been done in the Division of Physical Medicine and Rehabilitation, Rajah Muthiah Medical College and Hospital, Annamalai University, India.

Result: Ischemic compression followed by stretching was effective in pain relief and significant improvement of the pressure pain threshold of the myofascial trigger points.

The statistical analysis of functional reach test scores between pre-treatment mean value is 5.33, S.D is 0.72 and post-treatment mean value is 9.45, S.D 1.47, paired t-test value is 10.50 and P value is P(<0.001).

The statistical analysis shows that, there is significant difference between early stages than later stages. The rate of falls was comparatively reduced better with early stages of hemiplegia than the later stages.

Conclusion: Ischemic compression followed by stretching can be used as one of the early interventions in the treatment of myofascial trigger points.

***Index Terms*-** Myofascial trigger points, Algometry, Numerical Pain Rating Scale,
Abbrevations: Numerical **P**ain **R**ating **S**cale (**NPRS**)

I. INTRODUCTION

Myofascial trigger points are extremely common and become a distressing part of nearly everyone's life at one time and another. Despite their painfulness, myofascial trigger points are not directly life threatening, but their painfulness can, and often does, devastate the quality of life[1]. Myofascial trigger points are found among patients who have neck and upper back pain[2]. The mechanism of trigger points remains controversial. Electromyographic, clinical and experimental evidence all suggest that a myofascial trigger point, which begins with muscular strain, becomes the site of sensitized nerves, increased metabolism and reduced circulation[1]. Through this study the effect of Ischemic compression followed by stretching on myofascial trigger points is tried.

Ischemic compression applies sustained pressure to the trigger point with sufficient force and for a long enough time. We termed it Ischemic compression because, on release, the skin is at first blanched, and then shows reactive hyperemia[1].

Stretch is possible with a newly activated and only moderately irritable trigger point, to inactivate it immediately by simply stretching the muscle. The muscle must be completely relaxed and then firmly, slowly stretched to the point of moderate pain, gradually restoring its full normal length[1].

Literatures suggest that stretching the muscle after trigger point treatment is necessary to provide longer pain relief[2]. This has been part of therapy, regardless of the method used to decrease trigger point pain.

II. NEED FOR THE STUDY

Though it is evident that the Ischemic compression followed by stretching is effective in the treatment of myofascial trigger points, there is a limited amount of research to support this technique. Stretching the muscle after trigger point treatment is necessary to provide longer pain relief. Hence, the study is to focus on the efficacy of Ischemic compression followed by stretching on myofascial trigger points.

III. REVIEW OF LITERATURE

The literatures relevant to the present study; however studies that are related to the various trials, are reviewed in this chapter.

William P Hanten et al[2] (2000) compared Ischemic compression followed by stretching for the duration of 30 to 60 seconds to that range of motion exercises and concluded that the ischemic compression followed by stretching is effective than the range of motion exercises.

Guy Hains[3] said ischemic compression is a safe and effective method to successfully treat elicited trigger points or tender spots.

Hou CR et al[4] (2002) found that ischemic compression therapy provides alternative treatments using either low pressure (Pain threshold) and a long duration or high pressure (the average of pain threshold and pain tolerance) and short duration for immediate pain relief and myofascial trigger point sensitivity suppression.\

Research in 1993 by **Hong et al[5]** stated that ischemic compression is superior to other physical modalities for treating trigger points.

Prudden[1] (1980) applied sustained pressure to the trigger point with sufficient force and for a long enough time to inactivate it, which he called myotherapy.

Bonica et al[6] said pressure over trigger points and massage of muscles have been reported to be effective in treating myofascial pain syndromes.

Bandy WB et al[7] (1994) applied daily stretching of hamstring muscles for 15, 30 and 60 seconds, and found that 30 and 60 seconds stretches increase the range of motion more than a 15 second stretch.

Bonica et al[6] said gentle persistent stretch without spray is more likely to inactivate deep trigger points than spray without stretch.

Mc Claflin RR[8] (1994) suggested that myofascial pain treatment consists of physical modalities combined with a program of graded muscle stretching and strengthening. Early, aggressive treatment yields an improved prognosis.

Esenyel M et al[9] (2000) found that when combined with neck stretching exercises, ultrasound treatment and trigger point injections were equally effective.

IV. RELATED LITERATURE

Management of the myofascial pain syndrome follows with palliative care, splint therapy, muscle exercises, therapy to the trigger points, and behavioral therapy that depends on complexity of the case, said **Friction JR & Steenks MH(1996).**

Jaeger B & Reeves JL (1986) found that the results in 20 subjects, experiencing unilateral or bilateral myofascial head and neck pain, showed that myofascial trigger point sensitivity decreases in response to passive stretch as assessed by the pressure algometer.

Lewit K and Simon DG (1984) stated that increase tension of the affected muscle and resulting pain and dysfunction can be relieved by post isometric relaxation and gentle stretch.

Travell and Simons[1] (1983) said from their experience that stretch and spray was the 'Work Horse' of myofascial therapy. They used the expression, 'Stretch and Spray' not 'Spray and Stretch' because they considered stretch as the essential component, while the spray facilitated stretch.

Myofascial pain syndrome is pain and /or autonomic phenomena referred from active myofascial trigger points with associated dysfunction, said **travell and Simons[1] (1983)**.

The pressure threshold measurement gauge, developed by Fischer (1986), is a hand-held instrument calibrated in kilograms and in pounds of force exerted through a metal rod, which is fitted with a $1cm^2$ rubber disk screwed on to the tip. This method was also adapted by **Walsh et al[19] (1995)**.

EFFECT OF ISCHEMIC COMPRESSION FOLLOWED BY STRETCHING ON MYOFASCIAL TRIGGER POINTS

PROFORMA

Name :
Age :
Sex :
Address :
Presenting complaints :
Diagnosis :
Duration of the condition :
Myofascial trigger point : Active / Latent
No. of trigger points :
Muscles involved :
Side affected :

Pain intensity score (0-10) numerical rating scale	
Pre therapy	**Post therapy**
Pressure pain threshold measure using algometer	
Pre therapy	**Post therapy**

V. METHODOLOGY

SELECTION OF SUBJECTS

40 Physical medicine and rehabilitation out-patients were selected as subjects.

INCLUSION CRITERIA

- Patients who were willing to take part in the study.
- Patients presenting with myofascial trigger points in neck and upper back.
- All age groups and both sexes.

EVALUATION PROCEDURE

- Evaluation was carried out before and after therapy. Subjects were asked to express the grade of pain in numerical terms (0-10). Numerical Pain Rating Scale (0-10) 0- no pain at all, 10- the worst pain imaginable was incorporated in this study. Pressure algometer was used for the objective measurement of trigger point sensitivity.

EXPERIMENTAL PROCEDURE

- The subjects were positioned properly and comfortably.
- Firm digital compression was applied to the trigger point sufficient to produce localized discomfort / pain as well as symptoms in the target area.
- This compression was maintained for 5 seconds on and 2-3 seconds off until the patient reports a reduction in local or referred pain OR increase in pain (which is rare) OR until 2 minutes were passed with no change in the pain levels.
- Then, the stretches were performed for the same muscles and held each stretch for 30 to 60 seconds.

- The patients underwent the same therapy for 5 sittings (5 consecutive days).
- Then, the pre and post therapy values were analyzed.

VI. DATA ANALYSIS AND RESULTS

Table – 1
Pressure pain threshold measures before and after treatment (kg/cm^2)

Case No	Pre therapy X	Post therapy Y
1	1.8	5.4
2	1.4	6.5
3	0.8	6.1
4	2.1	6.2
5	2.1	6.7
6	2.0	6.0
7	1.3	7.2
8	1.8	7.5
9	1.5	6.8
10	1.6	6.1
11	1.7	6.1
12	2.2	5.6
13	2.1	7.7
14	2.3	7.7
15	1.7	7.4
16	1.1	5.9
17	1.7	6.3
18	1.6	7.2
19	2.1	8.2
20	1.8	6.6
21	1.1	5.5
22	1.7	6.5
23	1.3	6.0
24	2.1	7.2
25	2.1	7.2
26	1.8	5.9
27	1.5	6.8
28	2.1	7.9
29	1.7	5.4
30	1.4	5.9
31	2.0	6.0
32	2.1	6.1
33	1.7	7.0
34	1.8	5.8
35	2.0	6.6
36	1.7	6.3
37	1.7	6.5
38	1.8	7.5
39	2.2	8.4
40	2.0	7.8
Mean	**1.7625**	**6.625**

Table-1A

n	$\bar{d}$	s	t_{cal}	$t_{0.05}$ at 38 d.f.
40	4.9	0.73	42.21	1.96

Table -2
Progression chart for pain, graded by Numerical Pain Rating Scale (0 -10)

Case No	Pre therapy X	Post therapy Y
1	7	4
2	10	5
3	10	2
4	6	2
5	8	6
6	8	5
7	10	2
8	8	2
9	8	5
10	9	5
11	8	2
12	8	3
13	8	3
14	5	2
15	8	3
16	8	3
17	8	5
18	8	2
19	6	1
20	8	4
21	8	4
22	9	5

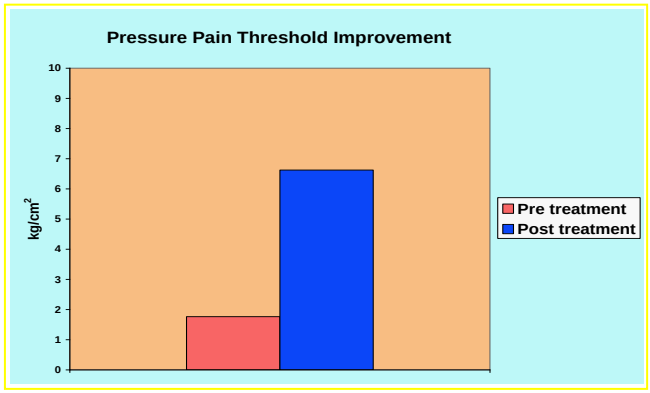
23	7	3
24	7	2
25	7	4
26	8	4
27	7	2
28	8	5
29	9	5
30	7	4
31	8	3
32	7	4
33	7	2
34	8	5
35	7	4
36	8	3
37	7	3
38	8	2
39	5	0
40	5	1
Mean	**7.65**	**3.275**

Table-1A

n	**p_0**	**np_0**	**Z_{cal}**	**$Z_{0.05}$**
40	0.5	20	6.17	1.96

With a view to find the efficacy of Ischemic compression followed by stretching in increasing the pressure pain threshold of the respondings, the measurements had been obtained. On the pressure pain threshold before treatment and after treatment indicated by pre and post therapy values. To examine whether the treatment has produced significant results, Students 't' test for paired observations has been applied for the data set given in table1. The null hypothesis to be tested is H_0: $m_1=m_2$, which implies that the pressure pain threshold values do not differ significantly before and after treatment. The results of the Students 't' test are given in table 1A. It is observed that the $t_{0.05}$ value at 38df=1.96. Since t_{cal} is greater than the table value, the null hypothesis H_0 is getting rejected. It implies that there is a significant difference in the mean values prior to and after treatment. Hence, it is concluded that the treatment significantly improve pressure pain threshold values.

With a view to measure the level of pain suffered by the respondents before treatment and after treatment, the intensity of pain suffered by the individuals have been recorded, using the numerical pain rating scale (0-10), as indicated by this numerical rating are recorded for the respondents. The values are given in table2. It is proposed to examine the average intensity of pain suffered by the individuals differ significantly before and after treatment. Since the observations are numerical integers as indicated by the grading a non-parametric test called 'Sign test' for paired observations has been applied for the data set given in table2. The null hypothesis to be tested is H_0: $m_1=m_2$, which implies that the average level of pain intensity before treatment and after treatment are same. The calculations are given in table 2A. On the basis of the 'Z' value computed to find that Z_{cal} is 6.17 and Z_{cal} is greater than 1.96. Hence, the null hypothesis H_0 is rejected. H_0 is rejected means the averages are not the same. Now take average of X values and take average of Y values. Average of Y is smaller than average of X. It implies that the pain intensity becomes reduced after the treatment.



VII. DISCUSSION

In my study 40 patients-27 females and 13 males were randomly selected and treated. Patients who were not only having acute, but also chronic myofascial trigger points were treated. Acute, subacute and chronic stages of 13 patients, 19 patients and 8 patients respectively. The statistical analysis shows that according to Numerical Pain Rating Scale, the pain was reduced better for patients with acute stage. There was no significant difference between acute and subacute stages. The rate of pain reduction was comparatively reduced for patients with chronic stage.

In the improvement of pressure pain threshold, there was no significant difference found between acute and subacute stages. When we compare acute and chronic stages, there was slight difference found in the improvement of pressure pain threshold.

Mc Claflin RR (1994) suggested that early and aggressive treatment yields an improved prognosis. Eriksson et al (1979) reported that at 2 months 55% of patients had effective relief, but that at 2 years this had fallen to 30%, with a 41% relief rate at 1 year. According to Mc Claflin and Eriksson et al, my results also show that the patients who had least number of trigger points with acute onset got good prognosis.

Travell and Simons said that the mechanism of relief in spray and stretch is the stretch. Based on the information presented, I hypothesized that a form of stimulation could relax the muscle to a point where sustained stretching would be tolerated without protective spasm or guarding contraction. Because this noninvasive procedure can produce stimulation. So I chose to combine Ischemic compression with stretch.

In my study, I demonstrated the short –term effectiveness of my treatment in reducing perceived pain and trigger point sensitivity. However, it is widely argued that in order to prevent an ongoing cycle of trigger point treatment and relapse, contributing or perpetuating factors should be considered. Travell and simons contended that the following are perpetuating factors for trigger point pain: mechanical stress, such as poor posture or muscle injury; nutritional inadequacies; metabolic or endocrine disorders; psychological factors; chronic infection; impaired sleep; radiculopathy; allergies; and chronic visceral disease. Many of these factors are controllable. Hong proposed that continued pain following trigger point treatment is likely the result of an etiological factors such as an intervertebral disc lesion, a muscle lesion, or an abnormal interneuronal circuit in the central nervous system that alters the trigger point pain loop. There are no studies that address the duration of pain relief associated with control of these contributing factors.

The results of my study demonstrate the effectiveness of Ischemic compression followed by stretching, in reducing trigger point sensitivity as measured with a pressure algometer and pain intensity scored with a numerical pain rating scale. Direct comparison of these results with the results found in other trigger point treatment experiments is only possible in a general way due to different treatment techniques, subject populations, measurements taken, and duration of treatment.

VIII. RECOMMENDATIONS

- Ischemic compression and stretching techniques can be given separately to get the same result. So, further studies are warranted by dividing into two separate groups- one group with stretching and another group with Ischemic compression.
- Ischemic compression and stretching can be compared with other electro therapeutic modalities.
- The therapy sittings can be increased.
- Functional limitations were not assessed in my study. Further studies can be done regarding the functional outcome and disabilities.

IX. CONCLUSION

Ischemic compression followed by stretching can be used as one of the early interventions in the treatment of myofascial trigger points.

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Conflict of Interest and: - This project work has been done by my own interest and cost

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AUTHORS

First Author – MENAKAM.P.T(Ortho),Lecturer,Annamalai University
Second Author – **K.KALAICHANDRAN** M.O.T(Neuro).,MSc(Psy).,MSc(App psy),**Senior Occcupational Therapist**, RMMCH, **Annamalai University** (**Former**, **Professor & Head**, school of OT, Faculty of Health Science, Kuala Lumpur Metropolitan University (**KLMU**), Kuala Lumpur, **Malaysia**) **Mail id:** **auckkn@yahoo.co.in**