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Immediate Effect of Myofascial Release using Cryoball Versus Lacrosse Ball on Pain and Cervical Range of Motion in Chronic Trapezitis - An Experimental Study

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Abstract: ***Background:*** *Trapezitis is an inflammatory pain causing a severe neck spasm, which may cause restricted ROM. The application of MFR is one of many ways to reduce Pain and improve Cervical ROM in Trapezitis.* ***Purpose:*** *To examine the immediate effect of MFR using Lacrosse ball versus Cryoball on Pain and Cervical ROM in individuals with Chronic Trapezitis.* ***Study type:*** *Experimental study.* ***Subjects:*** *20 individuals exhibiting Chronic Trapezitis; 10 individuals in each group.* ***Methodology:*** *After assessing individuals with Chronic Trapezitis for inclusion and exclusion criteria and signing of written informed consent, Pain was assessed by using NPRS and Pressure Algometer, and Affected side cervical side flexion and rotation ROM was assessed using Universal Goniometer. Maximum tolerable pressure for 120 seconds was applied throughout the length of the trapezius with Lacrosse ball in Group A and the same with Cryoball in Group B, followed by 30 seconds of rest. This was repeated thrice. Pain and Affected side cervical side flexion ROM was assessed post maneuver.* ***Result:*** *Pain and Range of motion were compared in both groups. Both the groups showed improvement in the pre and post-measurements, but there was more effect in MFR with Cryoball compared to that with Lacrosse Ball.* ***Conclusion****: The present study concluded that there is an immediate effect of myofascial release using cryoball versus lacrosse ball on pain and cervical range of motion in chronic trapezitis. Both the groups showed decreased pain and increased range of motion. However, more improvement was seen in the result of MFR with Cryoball compared to that with Lacrosse Ball.*

Keywords: MFR, Lacrosse ball, Cryoball, Trapezitis. **Shortforms used:** ROM=Range of Motion, MFR=Myofascial Release, NPRS= Numerical Pain Rating Scale.

1. Introduction

Due to its location and shape, the trapezius was previously referred to as a "shawl" muscle or "musculus calcularis" (shaped like a monk's hood)[1]. The triangular and flat trapezius muscle derives from the ligamentum nuchae, spinous process, and supraspinous ligament of all twelve thoracic vertebrae, as well as the medial third of the superior nuchal line of the occipital bone. Upper fibres are placed into the lateral part of the clavicle's posterior edge [2].As a postural muscle, the upper trapezius is particularly prone to overuse injuries. A strong neck spasm is brought on by trapezitis, an inflammatory discomfort coming from the trapezius muscle. The discomfort can be referred to another condition if it persists even when you're at rest and is made worse by activities; it may be referred to another area from the site of primary inflammation [3]. The trapezius is also activated by stressful thoughts and feeling or abnormal breathing patterns. 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. Recent studies have hypothesized that trapezitis pathogenesis results from the overloading and injury of muscle tissue, leading to involuntary shortening of localized fibers [4]. Trapezitis condition is subdivided as acute, sub-acute and chronic based on the time it occurs acute occurs for less than one month, the sub-acute condition lasts for 1-3 months and chronic is present for 3 or more than 3 months [5].

Muscle spasm occurs early after injury. This feels like tightness in the muscles and is sometimes painful. When the basic injury is not treated, spasm causes the formation of muscle knots, called trigger points [1]. Simons et. Al. defines a trigger point (TrP) as a hyperirritable spot associated with a taut band of a skeletal muscle that is painful on compression, palpation, and/or stretch, and that usually gives rise to a typical referred pain pattern [6].

Various manual therapies used for the treatment of trapezitis with the trigger are stretching, ischemic compression, transverse friction massage, and positional release technique [5]. The management lines have included the application of various electrical modalities, different types of exercises, and manual techniques to produce an immediate effect on reducing neck pain and desensitizing the MTrPs. It includes applications of hot packs (moist heat), ultrasonic/ laser/ microwaves/ infrared radiation therapies, transcutaneous electrical nerve stimulation, stretching/ strengthening exercises, manual techniques (muscle energy technique [MET]/ischemic compression technique [ICT]), and myofascial release techniques (strain-counterstrain [SCS]/ integrated neuroinhibitory technique [INIT]) involved in lengthening of shortened or contracted muscle and strengthening of muscles aid the drainage of fluid or blood, improve the range of motion of a stiff joint, and accentuate the relaxation of the contractile component of the muscles [7].

Myofascial release is a soft tissue mobilization technique, defined as "the facilitation of mechanical, neural and psychophysiological adaptive potential as interfaced via the myofascial system". 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. This technique acts as a catalyst in the reduction of trapezius spasm [1].

Exercises have proved to be very important for neck pain. These exercises strengthen the muscle, help in increasing the range of motion and improve mobility thus reducing the chance of recurrence of Trapezitis. Neck isometric exercises cause contraction and relaxation of the neck muscles thus massaging all the toxins, which are responsible for causing inflammation. Also, the muscle fibers are strengthened due to the same [3].

2. Materials and Method

The study was carried out at a Physiotherapy college in Ahmedabad. The duration of the study was 1 month. Materials used were: TENS, Lacrosse ball, Cryoball, Consent form, Pen, and Pencil. The study design is an Experimental study. 40 subjects were included in the study by the means of Convenient Sampling. Both males and females in the age group of 18-25 years, having no history of cervical trauma, with pain lasting for more than 6 months and positive jump sign were included in the study. The subjects were excluded if there was a history of any cervical spine injury, Cervical trauma with fracture or dislocation, Cervical Pathology, or Trapezitis associated with Cervical Pathology.

Figure 1: Instruments Used in the Study – Tens, Lacrosse Ball, Cryoball and Pressure Algometer

40 subjects diagnosed with Chronic Trapezitis, who fulfilled the inclusion criteria and with provocation test of jump sign. Every subject gave their informed consent. We gathered information on the subjects' demographic data. Chief complaint, history, VAS, Pressure Pain Threshold, and ROM of lateral bending of the cervical spine to the opposite side using goniometer were assessed before administering the treatment. Then the subject was to indicate the numeric value from 0-10 that best describes their pain intensity. 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 the primary trigger point. The pressure algometer was placed perpendicular to the area to be tested with the subject sitting in a chair, increasing the pressure steadily. Examiner then palpated the region of the upper trapezius and the pressure pain threshold was measured for the trigger point in the same manner as in the familiarization session. Then opposite side cervical side flexion range was measured using a goniometer. The fulcrum of the goniometer was placed on the 7th cervical vertebra.

Sampling Technique:

All the 40 subjects were assigned into 2 equal groups of 20 students each. The first subject that was included in the study was assigned to Group A and the second subject to Group B and the process was repeated.

3. Procedure

MFR using Cryoball

With the patient in comfortable sitting position on an armless chair and both feet firmly planted on the floor, MFR was applied with Cryoballfor 2 minutes with 30 seconds of rest. 3 sessions were performed.

Figure 2: MFR by Cryoball

MFR using Lacrosse Ball

MFR with Lacrosse Ball was applied to the subjects in the same position as in Group A for 2 minutes with 30 seconds of rest and 3 sessions were performed.

Figure 3: MFR by Lacrosse Ball

Conventional treatment

It included – Passive Stretching (5 seconds hold), Static neck exercise (10 seconds hold, 5 seconds rest), Shoulder Shrugs (5 seconds hold), and Scapular retraction. TENS with the frequency of 100 Hz, and pulse duration of 250ms for 20 minutes[2].

Outcome measures

The effectiveness of treatment was assessed by conducting three measurements. The subjective pain assessment was taken by numerical pain rating scale (NPRS) which is reliable for disability in patients with chronic musculoskeletal pain.[20] Pressure pain threshold was assessed by pressure algometer and ROM of the upper trapezius muscle (lateral bending of the cervical spine to the opposite side) by goniometer.

Statistical analysis

The data was analyzed by using SPSS version 26. All the values obtained before and after administering the protocol were expressed as mean ± SD. Wilcoxon test was used to analyze pre and post-test data in the group and the Mann-Whitney U test was used to analyze data between the groups. A p value of less than 0.05 indicates a significant difference.

4. Result

The average age of the study groups was 22.1 ± 2.1 for Group A and 22.2 ± 1.8 for Group B. The pre and post-treatment NPRS and ROM of lateral flexion and rotation showed significant difference ($p<0.05$) within both the groups. It indicated that MFR by both, Cryoball and Lacrosse ball, was helpful in reducing pain and improving range of motion. However, more improvement was seen in Group A compared to Group B.

Table 1: Result of Group A

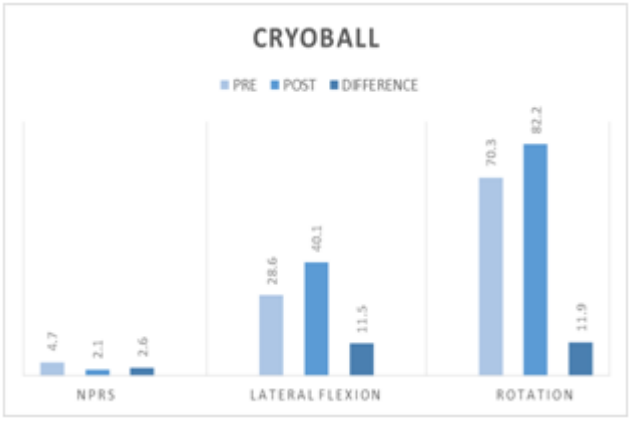
Outcome Measures	Pre – Test Mean	Post – Test Mean	Mean Difference	P – Value
NPRS	4.7 ± 1.4	2.1 ± 1	2.6	0.001
Lateral flexion	28.6 ± 4.5	40.1 ± 4.5	11.5	0.001
Rotation	70.3 ± 5.9	82.2 ± 5.5	11.9	0.001

Table 2: Result of Group B

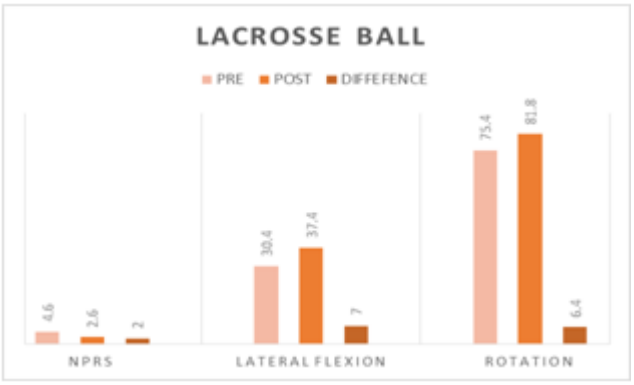
Outcome Measures	Pre – Test Mean	Post – Test Mean	Mean Difference	P – Value
NPRS	4.6 ± 1.4	2.6 ± 1.1	2	0.001
Lateral flexion	30.4 ± 4.1	37.4 ± 3.7	7	0.001
Rotation	75.4 ± 5.3	81.8 ± 4.8	6.4	0.001

Table 3: Comparision of Results of both the Groups

Outcome Measures	Cryoball (Difference Value)	Lacrosse Ball (Difference Value)	P – Value
NPRS	2.6	2	0.018
Lateral flexion	11.5	7	0.001
Rotation	11.9	6.4	0.001



Graph 1: Pre and Post Test Measurement in MFR by Cryoball



Graph 2: Pre and Post Test Measurement in MFR by Cryoball

5. Discussion

This comparative study of MFR using Cryoball and Lacrosse ball in combination with conventional treatment led to findings that both the A and B treatment groups showed a significant reduction in pain and improved range of motion. But MFR using Cryoball showed more improvement compared to MFR using Lacrosse ball.

When Myofascial Release is used on the TrPs, local chemistry changes due to blanching of the nodules followed by hyperemia. This flushes out the muscle inflammatory exudates and pain metabolites break down the scar tissue, desensitizes the nerve endings, and reduces muscle tone. Therefore, Myofascial Release and injectable treatment both work on trigger points practically in the same way.However, Myofascial Release is a non-invasive technique that does not produce post-treatment soreness or hemorrhage [1].

Chaudhary et. al. conducted a comparative cross–experimental study, in which 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 of pain and range of motion were recorded at baseline and after 5 treatment sessions. This study concluded that 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 the treatment of upper trapezius spasm [8].

Hence, this novel approach of using cryoball, which has the combined effect of cold along with MFR, can be used as a treatment for Trapezitis condition.

In this study, when MFR was applied using Cryoball, the cooling effect helped in pain reduction more than Lacrosse ball. The rolling effect was deep in MFR using Lacrosse ball compared with Cryoball. Hence, both approaches can be used as an adjunct to conventional treatment protocol or as individual treatment.

6. Conclusion

This study provided evidence to support the use of MFR using Cryoball and Lacrosse ball along with conventional treatment in the immediate management of Chronic Trapezitis. There was a stretching effect on muscle and stimulation of nociceptive endings connected to A-delta fibers in the application of MFR. However, a more statistically significant improvement was seen in the immediate effect of MFR using Cryoball because of the cooling effect.

7. Limitations

There was inadequate literature supporting the use of Cryoball. The study had a small sample size and short–term treatment protocol. Postural correction and ergonomic advice were not employed. Hence, further long–term study with a larger sample size can be conducted for the effectiveness of MFR using Cryoball and Lacrosse ball approaches. Also, a similar study could be performed on the spasm of other muscles. MFR could also be compared with other modalities.

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