Effectiveness of Integrated Neuromuscular Inhibitory Technique and LASER with Stretching In the Treatment of Upper Trapezius Trigger Points

Sibby[1], George Mathew, Narasimman[2], Kavitha Vishal [3], S.
Department of Physiotherapy, Father Muller Medical College, Mangalore.
[1]Postgraduate student, Department of Physiotherapy, Father Muller Medical College, Mangalore.
[2]Professor and Course Coordinator, Father Muller Medical College, Mangalore.
[3]Lecturer, Department of Physiotherapy, Father Muller Medical College, Mangalore.

Abstract

Upper trapezius trigger point is a common cause for neck pain, decreased cervical range of motion and affects functional activities. The purpose of this study was to compare the effectiveness of Integrated Neuromuscular Inhibitory Technique (INIT) and, Laser with stretching in reducing pain, improving ROM and functional activities of subjects with neck pain due to upper trapezius trigger points. Twenty-two subjects diagnosed with upper trapezius trigger point were included in the study. Seventeen subjects completed the study, in two groups. Group A (7 females, 3 males) received INIT and Group B (6 females, 1 male) received Laser with stretching. The total number of treatment was six days alternatively, within two weeks. The outcome measures were taken before and after treatment. Outcomes were measured by Visual numeric scale, cervical range of motion and neck disability index (NDI).Within the groups the VNS, NDI and cervical lateral flexion showed significant change in the mean value. The comparison of pre and post VNS in Group A, there was a significant reduction in VNS with a p value which was significant ($p = 0.005$).The pre and post VNS in group B showed a significant reduction in VNS, ($p = 0.018$), though there was no significant difference in the VNS score between groups ($p=.166$). The pre and post left lateral flexion (LLF) in Group A and group B showed a significant increase ($p = 0.012$) and ($p = 0.027$) respectively. NDI exhibited reduction across both the groups with a significant difference between the groups ($p=.045$) .This study concluded that both INIT and Laser with stretching are equally effective in managing subjects with neck pain due to upper trapezius trigger point.

Key Words: ***Myofascial pain, Trigger point, INIT, Trigger point pressure release, PRT, MET, LASER***

Introduction

Myofascial pain syndrome is one of the common musculoskeletal pain disorders which affects almost 95% of people with chronic pain disorders and is a common finding in specially pain management centre *(Skootsky, 1989; Simons et al, 1999 and Shah et. al, 2008).* It is characterized by trigger points, which are defined as hyperirritable spots within taut bands of skeletal muscle fibers. The syndrome is associated with tenderness in the muscle, characteristic referred pain, spasm and restriction of motion. Among the various muscles of the cervical region, the upper trapezius is more prone for developing trigger points due to continuous overload and micro-trauma as it has minimal antigravity function, leading to cervical myofascial pain syndrome *(Simons et al, 1999; Si-Huei & Chen, 2008).*

Myofascial pain syndrome responds well when treatment is targeted

at the trigger points. The various treatment techniques that are utilized for treating trigger points are LASER, trigger point injection, spray and stretch method, dry needling, ultrasound, TENS, trigger point pressure release (TrPPR)/ischemic compression (direct inhibitory pressure), muscle energy technique (MET), myofascial release therapy (MRT), positional release therapy (PRT) i.e. strain counter strain technique and integrated neuromuscular inhibitory technique (INIT) *(Chaitow, 2001; Farina et al, 2004)*. The effectiveness of INIT was reported in two case series, which showed rapid results with decreased pain and stiffness. The individual components (TrPPR, PRT and MET) of INIT has also been proved effective for treating myofascial pain syndrome *(Ambrogio & Roth, 1998; Chaitow, 2000; Chaitow & Judith, 2001).* LASER along with stretching is an effective treatment for trigger points (*Simunovic, 1996*). LASER alone as well as in combination with stretching has been proven to be effective in reducing cervical myofascial pain *(Ceccherelli et al, 1989; Beckerman et al, 1992; Hanten et al, 2000; Hakguder et al, 2003; Gur et al, 2004; Ilbuldu & Cakmak, 2004; Kiralp & Huseyin, 2006).*

The aim of this study was to compare the effectiveness of INIT and LASER with stretching in reducing pain, improving range of motion and functional activities in subjects with neck pain due to upper trapezius trigger point, since both these treatments can be utilized in the modern clinical setting.

Materials and Methods

Twenty-two subjects aged between 20- 40 years of age with neck pain who were referred to the department of physiotherapy at Father Muller Medical College were assessed for upper trapezius trigger point and included in the study. Informed consent was obtained from all the subjects, but five subjects withdrew from the study due to various reasons. Seventeen subjects completed the study. The study was approved by the ethical committee of the hospital.

Inclusion criteria:

1. Patients with neck pain due to upper trapezius trigger point in the age group of 20 – 40 were included for this study.

Exclusion criteria:

1. Subjects with moderate to severe cervical, thoracic and shoulder degenerative pathology.
2. Individuals with neuromuscular entrapment or compression syndrome of cervical spine, or shoulder origin.
3. Subjects having history of trauma to spine or neck shoulder region, history of surgery to spine and shoulder.
4. Subjects with any systemic disorder.
5. Subjects with congenital and acquired spinal deformities.
6. Subjects with any space occupying lesion in neck and shoulder region.

Outcome measure

- Visual numeric scale-Primary outcome
- Neck Disability Index
- Cervical Range of Motion

Visual Numeric Scale Recording

The VNS consists of a simple 10 cm line, one end marked with zero and the other being marked with ten. Each number in between (1-9) was marked at 1

cm distance each. The points 0 - 10 indicated the pain level, zero representing no pain and 10 indicating the worst and most severe type of pain (*Wong & Baker, 1988*). All other numbers from one to nine, indicated on the line, where the pain was. The subject chose a number on the scale, rating his/her own pain appropriately. *Ritter et al (2006)* in their study established that measurement of pain using visual numeric scale is a valid measure.

Neck Disability Index score

The NDI questionnaire is a 10 item questionnaire which included feedback of the subjects regarding their pain, ability to do activities of daily living, ability to concentrate and presence of headaches. The scale consisted of discrete categories within which each item was weighted and responses were summed up and its percentage was taken. *Vernon and Mior (1991)* concluded from their study that NDI had a high degree of reliability and internal consistency.

Goniometric Assessment of Cervical Range of Motion

The universal goniometer was used to measure the cervical range of motion of flexion, extension, lateral flexion to both sides and rotation to both sides (*Norkin & White, 1998*).

A total of twenty-two subjects were randomly assigned to the two groups by simple randomization using chits, to avoid bias. Five subjects withdrew due to various reasons. Group A comprised of 10 subjects and was treated with Integrated Neuromuscular Inhibitory technique (INIT) while group B (LASER and stretching) had 7 subjects to whom LASER and stretching was administered. For the purpose of this study Laser was considered as a control group. All subjects were assessed to rule out pain in the neck arising from compressive and entrapment syndromes. Foraminal compression test and upper limb tissue tension tests were performed. Subjects with neck pain due to upper trapezius trigger points were included in the study and an informed consent was obtained from the subjects for the same. The subjects' intensity of pain was documented on visual numeric scale (VNS). The subjects were then provided with a neck disability questionnaire (NDI). The questions on the scale were explained in detail and the subjects were then asked to choose the most appropriate alternative, the therapist cleared any difficulties in understanding or choosing an alternative in the questionnaire.

After the pain scale and NDI questionnaire was administered, cervical range of motion was measured. The trigger point in the upper trapezius was identified and marked with a marker. It was then measured from the acromion process and recorded so that subsequent treatments over the same trigger point were standardized.

Integrated Neuromuscular Inhibitory Technique Sequences

In Group A, powder was applied in the area of upper trapezius where trigger point was marked. Then trigger point pressure release was applied by using pincher grip between the thumb and index finger intermittently until the patient reported that the local or referred symptoms had reduced. The pressure was applied in an intermittent manner initially and then continuously for 90 seconds according to patient's tolerability.

After this procedure the pressure was maintained without complaints of referred pain pattern. Patient's head was passively laterally flexed towards the affected side; the therapist then held the patient's forearm and moved the affected side shoulder passively to approximately 90^{o} of abduction, while monitoring the tender point pain with the other hand. Then the fine tuning was made with slight flexion or extension of the shoulder so that maximum ease was achieved.

The upper trapezius was stretched using Muscle Energy Technique (MET). The patient was asked to take the stabilized shoulder towards the ear (a shrug movement) and the ear towards the shoulder. The degree of contraction was mild and pain free (20% of maximum voluntary contraction). The contraction was sustained for 10 seconds and upon complete relaxation of effort, the therapist gently eased the head/neck into an increased degree of side bending and rotation, where it was stabilized, and the shoulder stretched caudally. The stretch was maintained for 10-30 seconds.

Duration of treatment - Alternate days for two weeks, with three treatments in one week. A total of six sessions of treatment were given.

LASER and post-isometric stretching (MET)

To Group B subjects, a BTL-5000 LASER was applied to the upper trapezius trigger point. The LASER emission was calibrated automatically by the equipment before each use.

The patient was asked to lie still for three minutes and the LASER was applied perpendicular with energy of 1 Joule/cm^2 and frequency of 1000 Hz to the upper trapezius trigger point which was marked. Minimal pressure was applied during the treatment till the patient's pain tolerance *(Baxter, 1995)*. After laser application, the upper trapezius was stretched using muscle energy technique (MET) on alternative days for two weeks, with three treatments in one week. A total of six sessions of treatment were given.

Results & Discussion

A total number of 17 subjects with upper trapezius trigger point, 13 females and 4 males with the mean age of 25.07±4.5 constituted the sample of the study. In group A, there were 7 females and 3 males; whereas group B had 6 females and 1 male. Six subjects of group A and 7 of group B reported right side symptoms.

Table 1: Comparison of pre and post VNS score in Group A and B

GROUP	PRE	POST	P
A	4.90±2.56	5.29±1.38	0.005
B	0.30±0.68	2.00±1.83	0.018

Table 2: Comparison of pre and post NDI score in group A and group B

GROUP	PRE	POST	P
A	36.64±8.719	21.70±3.151	0.005
B	55.49±19.457	27.29±5.691	0.018

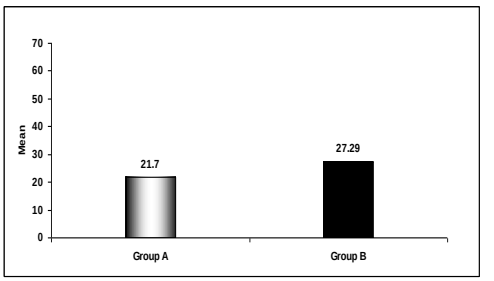

Figure 1: Comparison of post NDI score between Group A and Group B

Figure 1: Comparison of post VNS score

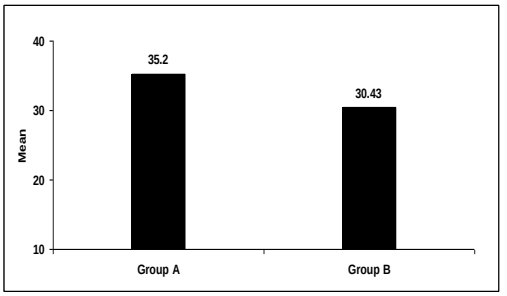

Figure 2: Comparison of pre NDI score between Group A and Group B

The aim of this study was to compare the effect of INIT and LASER with stretching in reducing pain; improving ROM and reducing disability in subjects with upper trapezius trigger point.

There was significant reduction in pain as assessed by VNS in the group that was managed with INIT (Table 1 & Fig 1). The pain reduction may be due to the stimulation of mechanoreceptors which has influence on pain gate during the application of trigger point pressure release and increased circulation, after releasing the pressure which ultimately resulted in pain reduction. PRT also helps in reducing tender point in the affected muscle by the mechanism of automatic resetting of the muscle spindles. This is supported by the findings of *Albert and Fernandez (2006)* who used PRT to reduce tenderness of the upper trapezius. A study done by *Wong and Alvarez (2004)* reported that PRT is effective in reducing pain in the hip musculature. *Fernandez et al (2006)* concluded that trigger point pressure release and transverse friction massage reduced pain due to upper trapezius trigger point in patients with pain. *Hanten et al (2000)* also reported reduction in pain after trigger point release to the muscles. In this study the integrated approach (Trigger point pressure release + PRT) was used in group A, the combined effect might be more than the single technique.

In the Laser group (Group B), there was also significant reduction in pain (Table 1 & Fig 1) which might be attributed to the increment in the local micro circulation in the trigger point area and washout of pain substances. It has been proposed that LASER may improve the oxygen supply by increasing the microcirculation. As explained by several authors hypoxia plays a major role in the development of pain due to trigger point. A study done by *Ceylan and coworkers (2004)* used infra red laser and found reduction in pain and increased excretion of serotonin degradation products in 24 hour urine excretions. They used 904 nm, for three minutes where as *Ceccherelli and coworkers (1989)* used 1000 Hz, 1 joule/cm^2 in muscles with cervical myofacial pain. The same dosage was used in the present study also.

There was no significant difference in VNS score between the two groups before the treatment. After treatment, again no significant difference was observed between the two groups with respect to VNS. This shows that both INIT and Laser are effective in reducing neck pain due to upper trapezius trigger point.

Among the various cervical ranges of motion measured, only lateral flexion showed significant change. The lateral neck flexion improved significantly in the group which received INIT. This improvement in the ROM may be due to PRT and MET which mainly works on decreasing the spasm or tightness of muscle by first resetting the muscle spindle and inhibiting the muscles

by activating the golgi tendon organ. This phenomenon is called post isometric relaxation in which there is a period of a relative hypotonicity during which a stretch of the involved muscle is more easily achieved than before contraction. A study by *Lewit and Simons (1984)* observed that post isometric relaxation helps in reducing the increased tension by restoring the full length of the muscle.

The neck disability score decreased significantly in the group that received INIT (Table 2 & Fig 2). The improvement may be attributed to the ROM increments produced by the same. The NDI score within LASER group showed significant improvement, but there was no statistically significant difference between the groups, which may be due to the uneven distribution of subjects between the two groups. Though the total number of participants in this study was less to generalize the effect, this study gives an insight in to the application INIT in managing Myofacial trigger points.

Conclusion

This study supports that upper trapezius trigger point can cause neck pain, with restriction in cervical range of motion and increased disability according to neck disability index. Individually both Integrated Neuromuscular Inhibitory technique (INIT) and Laser with stretching was found to be effective in reducing neck pain, improving cervical range of motion and reducing neck disability, however when both groups are compared, there is no difference in the outcome measures. Hence it can be concluded that both INIT and Laser with stretching are equally effective in managing neck pain due to trapezius trigger point.

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