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Effectiveness of Therapeutic Laser with Stretching Versus Dry Needling With Stretching On Pain and Cervical Lateral Flexion ROM in Subjects with Myofascial Trigger Point in Upper Trapeziums Muscle.

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Abstract: *This study aims to find out immediate effects of therapeutic laser and stretching versus dry needling and stretching on pain and cervical lateral flexion ROM in subjects with myofascial trigger point in upper trapezius muscle. Study was conducted on 30 patients which were divided into 2 groups, 15 patients in each group. Patient aged 18-50 years were included in the study. Cervical lateral flexion ROM, pressure pain threshold and NPRS was assessed.Analysis using paired t test found that there is a statistically extremely significant improvement in ROM, pain intensity and threshold in group A whereas statistically significant improvement in pain threshold and NPRS for group B; except for ROM which showed extreme statistical improvement. Analysis using unpaired t test found that there is no statistical difference in improving ROM and pressure pain threshold except for NPRS which was statistically significant between group A and B.This study concludes that both the techniques are equally effective in decreasing pain and improving cervical ROM in subjects with upper trapezius trigger point. Clinically more improvement was seen in group B as compared to group A.*

Key Words: *Dry needling, Stretching, Therapeutic Laser, Upper Trapezius, cervical lateral-flexion ROM*

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I. Introduction

Myofascial trigger points are among the most common myofascial pain syndrome with a point of lifetime prevalence from 30% to 50%. In many people with MTPt symptoms, cause severe discomfort and inability to work. Myofascial pain symptoms usually involve muscle pain with specific "trigger" or "tender" points. The pain is aggravated with activity or stress. In addition to the local or regional pain, untreated and chronic cases might lead to symptoms like depression, fatigue and behavioral disturbances [(1,2).]

Trapezius is synergistic to deltoid and supraspinatus, and hence with any shoulder pathology involving these muscles, trapezius tend to compensate and carries out shoulder abduction smoothly. Hence, upper trapezius bear more stress and tend to contract eccentrically more, since it is the postural muscle. The trigger points produced is the hyperirritable spot in a taut band of the skeletal muscle that is painful on contraction, stretching and stimulation. It elicits pain that is distant from point. Trigger points are the palpable, thick, rounded, darkly stained muscle fibers having increased fiber diameter[(3).]

Common causes for MFTPs are eccentric contractions in unconditioned muscles, uneven intramuscular pressure distribution, low level muscle contractions, direct trauma, repetitive concentric contractions in muscles, repetitive loading over muscles. With this etiology the muscles tend to remain in a contracted state due to reduced oxygen supply, reduced ATP formation and with increased levels of Acetylcholine (Ach) and calcium levels. Therapeutic dry needling is an established modality for the treatment of myofascial pain, whereas limited research on Therapeutic Laser exists. Therapeutic Laser is becoming popular, with the main benefit of being non-invasive, thereby extending the treatment to the patient. This study aimed to determine the relative effectiveness of these two treatment modalities in patients with myofascial pain syndrome of the Upper Trapezius muscle[(1,3,4).]

Dry needling technique (DNT) is found to be the most effective treatment as a local anesthetic and has segmental anti-nociceptive effect[(5).] DNT works by releasing the knots by decreasing the overlap between actin and myosin filaments, increasing the capillary permeability and ATP production[(6,7).] Other treatment method in contrast to DNT used is therapeutic LASER that is used in the treatment of MPS with its analgesic, myorelaxant, tissue healing, and biostimulation effects. . Lasers are the electromagnetic wave amplifiers which can produce pencil-like beam of electromagnetic waves with special properties. The wave energy produced by

laser is always concentrated on same area. Laser radiation is monochromatic i.e. has a single wavelength, it is coherent i.e. it travels in same direction (spatial coherence) and is same phase (temporal coherence) and is collimated i.e. it is a parallel beam. Therapeutic Laser is used for tissue healing and pain control[8,9].

II. Purpose

To compare immediate effects of therapeutic laser with stretching versus dry needling with stretching on pain and cervical ROM in subjects with myofascial trigger point in trapezius muscle.

III. Materials and Methodology

The study was been conducted at MVP'S Medical College Hospital, 30 patients having myofascial trigger point in upper trapezius muscle were screened and conveniently divided into two groups : A - Therapeutic Laser and group B: Dry needling technique, with conventional therapy common in both the groups as passive stretching and for home program self-stretching were being given. Pre and post treatment scores were assessed with the outcome measures Cervical lateral flexion ROM, pressure pain threshold using digital algometer and pain intensity measurement using NPRS before and after the treatment. Subjects were recruited as per the following inclusion criteria:1)Participants with either gender with a age Group : 18-50years 2) participants with a taut palpable band 3) participants with a palpable nodule within the palpable band 4) Participants who elicit a jump sign on palpation 5) The zone of reference of the palpated trigger point is in accordance of that mentioned 6) Decreased cervical lateral flexion range of motion 7) participants with pain on active or passive stretching of muscle 8) Participants having unilateral involvement. Subjects were excluded if they had:1) Patients with previous surgery that could have affected the trapezius muscle (e.g. : cervical vertebral fusion or cervical rib resectomy) 2)Severe trauma causing fracture or other soft tissue injury 3)Signs and symptoms of cervical radiculopathy , brachial plexopathy or other nerve impingement or pathology 4) Medications: analgesics, muscle relaxants, NSAIDS, etc. 5)Research subjects known to have former adverse effects from either dry needling or laser 6)Fever, regional skin infections or malignancy, pregnancy , severe blood dyscrasias, chronic cardiac failure. 7) People with needle phobia or those prone to convulsions eg: epilepsy.

1. PROCEDURE:

30 patients suffering from unilateral upper trapezius myofascial pain syndrome meeting inclusion criteria were included in the group and were divided using convenient sampling method into 2 groups. Group A: therapeutic laser and Group B: Dry needling technique with conventional therapy common in both the groups as passive stretching and for home program self-stretching were given. Demographic data of the patients, degrees of cervical contralateral lateral flexion affected with the help of goniometer, pressure pain threshold using digital pressure algometer and pain intensity using NPRS was obtained and informed consent form was duly filled by the patients. Laser therapy was given using a handheld apparatus the size of a large marker pen, had one laser diode with 0.5 beam diameter, 780nm of wavelength, energy output of $5J/cm^2$, continuous 5mW of power output for 3 mins 16 secs duration. On the other hand Dry needling being a invasive procedure was done under sterile conditions, using alcohol swabs to clean the participant's area of the body in which the needle was to be inserted. The hands of the therapist was cleaned prior to opening of the needle from its packaged covering and after the needling procedure. A single insertion with a 25mm 0.25G needle was performed into the core of the trigger point whilst the patient was in prone position.

1.1 THERAPEUTIC LASER APPLICATION:1) Patient position: prone lying**.** 2) Mark the area to be treated with the marker and with the therapist standing at the head end of bed, laser is applied.

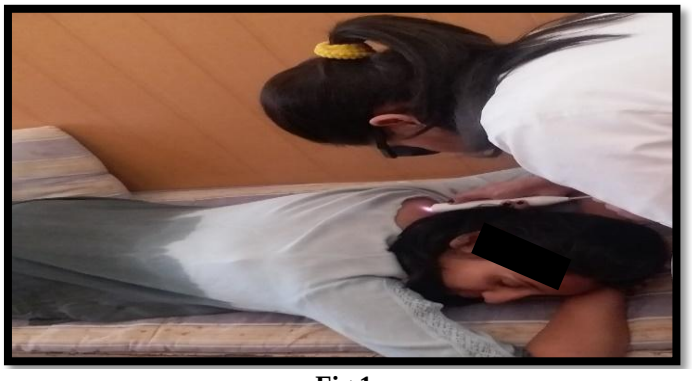

Fig.1

1.2DRY NEEDLING THECHNIQUE APPLICATION:1) Patient position: prone lying**.** 2) The MFTP was located using a marker and muscle was lifted using pincer grasp palpation, and lifted during needle insertion to eliminate risk of lung puncture. The needle was inserted at an angle of about 30º inferior to superior to further minimize the risk and deep dry needling was performed.

Fig. 2

Fig. 3

1.3 CONVENTIONAL THERAPY: PASSIVE STRETCHING: 1) Patient position:Sitting

2) Therapist position: Standing behind patient.3) Patient sitting with the ipsilateral hand behind the back to stabilize the scapula and the head rotated to the tight side.4) Therapist standing behind applies the stretch by adding a combination of cervical flexion, rotation the tight side and side bending away from the tight side.5) A more aggressive manual stretch was been performed by using the other hand to depress the distal clavicle and the scapula.6) Stretching : 5 times ,duration : 30 sec of hold (Refer Fig.4)

1.4 HOME PROGRAM: SELF-STRETCHING:1) Patient position: sitting 2) Contralateral side flexion and ipsilateral rotation with the shoulder girdle depressed.3) Entire stretching was done with the neck flexed for 5-10 times.4) Stretching : 5 times.4) Duration : 30secs (Refer Fig.5)

Fig. 4

Fig. 5

IV. Result

The results were analyzed in terms of reducing pain intensity, improving pain threshold and cervical lateral-flexion ROM. Statistical analysis was done using Graphpad Quick Calcs software. Statistical measures such as mean, standard deviation and test of significance (paired t-test) were used to analyze the data.

Table 1: Comparison of Pre and Post treatment value of Cervical lateral flexion ROM, pressure algometer and NPRS in Group A and B:

		Cervical lateral flexion ROM		Pressure Algometer		Numerical Pain Rating Scale (NPRS)	
		Group A	Group B	Group A	Group B	Group A	Group B
Pre TREATMENT	Mean	31.67	33.80	30.80	23.33	7.07	7.20
	SD	3.24	4.46	8.48	4.42	0.59	1.15
Post TREATMENT	Mean	35.67	40.13	33.53	29.20	5.40	4.20
	SD	2.97	3.81	7.93	4.55	1.76	2.04
	t – value	6.5633	6.0871	2.3384	8.8764	4.0632	7.4558
	P value	<0.0001	<0.0001	0.0347	<0.0001	0.0012	<0.0001

Table 2: Mean difference score of Cervical lateral flexion ROM, pressure algometer and NPRS BetweenGroupA and B:

	Cervical lateral flexion ROM		Pressure algometer		Numerical Pain rating scale	
	Group A	Group B	Group A	Group B	Group A	Group B
Mean	4.00	6.40	3.67	5.87	1.80	3.00
SD	2.36	4.00	3.75	2.56	1.42	1.56
F value	2.0027		1.8751		2.2014	
P value	0.0550		0.0712		0.0361	

V. Interpretation

Group A and B are statistically significant. Group B i.e. Dry needling technique with passive stretching is clinically more effective compared to the other group.

VI. Discussion

The purpose of the study was to determine the immediate effects of therapeutic laser with stretching versus dry needling with stretching on pain and cervical ROM with myofascial trigger point in trapezius muscle. This study is targeted on upper trapezius muscle trigger points as it is considered to be the commonest postural muscle which tends to get shortened when it is stressed; suggested by Jan Hendrik Westhuizen, who also suggested that MPS to be the commonest diagnosis, with MFTPs being accepted as a part of the syndrome[(1)] . Muscle trigger points specifically of upper trapezius occurs commonly as this is synergistic to supraspinatus and deltoid; hence any shoulder pathology affecting these muscles invariably tend to have overactivity in upper trapezius suggested by Priya Kannan (2012) and further suggested that this can be frequent cause for head and neck pain and can lead to poor posture habits[(2).]

In this study 30 subjects, with upper trapezius trigger point were randomly assigned in group A which consisted of therapeutic LASER with stretching and group B which consisted of DNT with stretching , among the 30 subjects 15 were included in each of the groups. The outcome measure were cervical lateral flexion ROM (Universal Goniometer), pressure pain threshold (Digital Pressure Algometer), pain intensity (NPRS). David J. Alvarer (2002), Rocio Ramos (2014), Irena Moran (2015) & many others collectively concluded that MFTPs causes reduced muscle flexibility, resulting in decreased active as well as passive lateralflexion ROM. And has further suggested of having reduced pressure pain threshold with increase in pain intensity for which pressure algometer and NPRS could be used as an valid measure [(,7,11,15)]. In a study by Irene Moran et.al. (2015) she stated that neck pain is one of the most frequent pain condition due to MFTPs of trapezius muscle, preventing neck mobility through its potential range [(11).] Another valid outcome measure suggested by researcher Giburm Park et.al. (2011) was that the pressure pain threshold using digital pressure algometer helped in measuring tenderness resistance and quantifying the threshold of muscles to bear pain on applying deep pressure[(13).]

In this study as seen in table 1; Group A (therapeutic LASER+stretching), paired T- test was applied which showed p value <0.0001for CROM OF (***LATERAL FLEXION***), 0.0347 for Pressure algometer and 0.0012 for NPRS which is statistically significant. Hence, significant changes are noted by this treatment technique. LLLT improves the oxygen deficit by regulating microcirculation to the hypoxic cells in trigger point areas, increasing ATP formation with a consequent normalization in metabolic rate of the tissues with diminished energy levels. And stretching of the muscle at the same time causes mechanical disruption of the cross bridges as the filaments slide apart leading to lengthening of sarcomere, this helps in increasing range of motion of the given movement provided that the muscle is stretched to the opposite side [(4,5).]Hakguder et al. (2003) tested the effect of low level laser therapy with stretching in MPS for upper trapezius muscle and found results to be clinically effective in reducing pain and improving neck range of motion[(4).] Luciana Umenol(2013) have also proved that Laser therapy with stretching was able to increase the cervical range of motion and reduce pain intensity [(5).]

The other technique DNT (Dry Needling Technique) as seen in table 2 group B, paired T- test was applied and the p – value <0.0001 that is extremely significant. When the needle penetrates the skin it stimulates underlying MFTP releasing the knot, thereby decreasing overlapping between actin and myosin filament. It also increases capillary permeability and vasodilatation so that there is oxygen supply increased to the trigger point areas. This damages motor endplates by denervating distal axons [(7)] .Hence, relieving spasm and improving muscle length (lengthening sarcomere) given by Lynn Gerber et al. (2015) similar effects were stated by Rocio Ramos et al. (2014) on mechanical neck pain and had significant changes [(7,10).] Jan Hendrik Westhuizen (2016), Maryam Ziaeifer (2016), Marin Zugasti (2016) have also studied the effect of DNT on upper trapezius trigger point and have reported to have similarly increase in lateral flexion ROM and improving pain threshold[(1,6,8)] .Cagnie B (2015)also studied the effect of DNT on trapezius muscle in patients with neck pain and found it to be effective [(3)] .

VII. Conclusion

This study concludes that Therapeutic LASER and dry needling technique are equally effective in decreasing pain and improving cervical lateral flexion ROM in subjects with myofascial trigger point in upper trapezius muscle.

1. LIMITATIONS:1) Limited sample size. 2) Limited age group. 3) Unilateral trapezius included.
2. RECOMENDATION FOR FUTURE STUDY: This study can be repeated using different target population, with a different age group, with involving both the sides of measuring cervical ROM.

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