



**A COMPARATIVE STUDY OF EFFECTIVENESS OF ISCHEMIC
COMPRESSION TECHNIQUE VERSUS LOW LEVEL LASER
THERAPY ON MYOFASIAL PAIN ON UPPER TRAPEZIUS**

**Krishnagiri Sundaresh¹, Shaik Mohammad Imran², M Venkata Subba Reddy² and
Bellara Raghavendra^{3*}**

¹Associate Professor, Department of Orthopedics and Physical Medicine and Rehabilitation,

²Physiotherapist, Department of Physical Medicine and Rehabilitation,

³Associate Professor, Department of Community Medicine,

Vijayanagara Institute of Medical Sciences, Bellary, Karnataka, India.

Corresponding Author:- **Bellara Raghavendra**

E-mail: bellararaghu@gmail.com

<p>Article Info</p> <p><i>Received 15/09/2014</i> <i>Revised 27/10/2014</i> <i>Accepted 02/12/2014</i></p> <p>Key words: Myofascial syndrome, Ischemic compression technique, Laser therapy.</p>	<p>ABSTRACT</p> <p>Myofascial pain syndrome is one among the common disorder in the world population. It is a common source of discomfort and disability for many patients. Myofascial pain is generated by Myofascial trigger points in muscle tissue. There are various studies conducted on the efficacy of Manual techniques and Physical therapy modalities to reduce pain due to Myofascial trigger points. The present study objective to assess and compare the effectiveness of Ischemic compression technique and Laser therapy on treating Myofascial pain syndrome. A randomized control study was conducted in the setting of Physiotherapy department of Vijayanagara Institute of Medical Sciences. A total of 40 subjects confirmed with unilateral Myofascial trigger points pain in the upper trapezius were selected for the study who were randomly allocated into group A (20 subjects) in which they received Low Level Laser Therapy and group B (20 subjects) in which they received Ischemic compression technique. The pretreatment VAS score was taken before applying the treatment in all the 6 sittings and post treatment VAS score was taken after applying the treatment in all the 6 sittings in both the groups. Inter group analysis showed that Group B was more effective than Group A in reducing pain as there was a statistically significant difference (P value <0.05) in the mean difference of VAS between the two treatment groups. Ischaemic compression technique was more effective than that of Low level Laser Therapy, in terms of reducing pain and number of sessions.</p>
--	--

INTRODUCTION

Myofascial pain syndrome is one among the common disorder in the world population. It is a common source of discomfort and disability for many patients. Fibromyalgia syndrome (FM) is defined in the 1990 American College of Rheumatology (ACR) criteria, as a chronic, generalized pain condition with characteristic tender points on physical examination, often accompanied by a number of associated symptoms such as fatigue, sleep disturbance, headache, irritable bowel syndrome and mood disorders [1]. Its prevalence is 1- 3%. It occurs

predominantly in females between the age of 40-50 years [2], while representing 30% of rheumatic diseases. Fibromyalgia is characterized by diffuse chronic pain for more than 3 months and bilateral sites of focal tenderness. The symptoms associated with fatigue, sleep dysfunction, stiffness, depression, cognitive disruption, and exercise intolerance [3]. In myofascial trigger point pain is a main feature and it has two types, these are active and latent trigger points. Active is with a spontaneous pain and latent is a sensitive spot that cause discomfort in response to



compression. Although pain and tenderness are the cardinal features of the fibromyalgia diagnosis, other symptoms, such as chronic headaches, mood disturbances, irritable bowel syndrome, and irritable bladder are found in the majority of individuals [4-6]. The prevalence of Myofascial musculoskeletal pain disorder has been increasing dramatically in recent years [7-9]. There are various studies conducted on the efficacy of physiotherapeutic modalities and manual techniques to relieve pain in Myofascial trigger points. Some of the non-Invasive therapeutic modalities includes Ischaemic Compression, Myofascial Manipulation, Spray and Stretch, Transcutaneous Electrical Nerve Stimulations, Laser Therapy, Ultrasound, Static-Stretching and Proprioceptive Neuromuscular Facilitative Stretching (PNF) [10]. Therefore a study is conducted to assess and compare the effectiveness of Ischemic compression technique and Laser therapy on treating Myofascial pain syndrome.

OBJECTIVES

1. To assess and compare the effectiveness of Ischemic Compression technique versus Low Level Laser Therapy in reducing pain in patients with Myofascial trigger points of upper trapezius.

METHODOLOGY

Study design and study setting

A randomized control study was conducted in the setting of Physiotherapy department of Vijayanagara Institute of Medical Sciences, a tertiary care hospital, Bellary district, Karnataka state, India.

Study subjects and sample size

Subjects who were coming to the Physiotherapy department with musculoskeletal pain were assessed by using evaluation form to screen for Myofascial trigger points. Those subjects confirmed with unilateral Myofascial trigger points pain in the upper trapezius both acute and chronic pain, in the age group of 20 to 40 years with palpable nodule and palpable Taut Band in the muscle were included in the study and randomly divided into two groups. A total of 40 subjects were selected for the study who were randomly allocated into group A (20 subjects) in which they received Low Level Laser Therapy and group B (20 subjects) in which they received Ischemic compression technique.

Subjects with pain of traumatic or infective origin, Rheumatoid arthritis, Ossification or calcification of soft tissue, dermatitis, open wounds over trapezius, Degenerative changes and ankylosis of the cervical spine etc were excluded from the study.

Method of data collection

Apart from collecting the basic information of the subjects like age, sex etc, pain was quantified by using Visual Analogue Scale score as a measurement tool to measure the pain. A pretreatment visual analog scale score

and post treatment VAS score was taken for this study. The pretreatment VAS score was taken before applying the treatment in all the 6 sittings and post treatment VAS score was taken after applying the treatment in all the 6 sittings in both the groups.

Intervention Procedure

When the subjects in both the groups reported for the treatment, they were given time to get prepared for the treatment with the upper back exposed. The female patients were given more privacy and their attendee was allowed with them throughout the treatment. The patients were in arm rest position and they were instructed to inform if any discomfort was felt during the treatment procedure.

Subjects in group A receiving Low level laser therapy were evaluated for areas of restriction. The treatment area was cleaned using cotton and saline. The treatment was applied by the therapist standing at the side of the patient. The treatment period was 6 sessions. Endolaser 476 (Enraf-Nonius), a Ga-As-Al laser device which has the probe with 0.5 cm beam diameter and emitting laser beam with 780 nm wavelength was used. The maximum power output of the device was 10 mW. The energy intensity given to the trigger points was adjusted to be 5 J/cm² by applying a continuous 5 mW power output (50% of the maximum) for 3 minutes 16 seconds duration per trigger point in each session [11].

Subjects in Group B receiving Ischaemic Compression technique were evaluated for areas of restriction. The treatment area was cleaned with water using cotton and the area was dried before applying the technique. Later, powder was applied on to the treatment area in order to reduce friction thereby, preventing blister formation. The therapist will stand behind the subject. Once trigger point is located on the upper fibers of the trapezius, Ischemic compression technique was applied by a physical therapist using the thumb and forefinger in a pinching motion for three applications of 60 seconds each, followed by a 30-second rest period.

It is described as follows, "Application of slowly increasing, nonpainful pressure over a TrP until a barrier of tissue resistance is encountered. Contact is then maintained until the tissue barrier releases, and pressure is increased to reach a new barrier to eliminate the TrP tension and tenderness." with closely monitoring and observing the subject's tolerance to the pain [12].

Statistical analysis

Data were entered into an electronic database and analysis was done using SPSS version 16 (SPSS, 2007). Descriptive statistics like proportions, mean and standard deviation were used to describe the age and sex variables and VAS scores. Comparison of VAS scores before and after treatment within the groups were subjected to Wilcoxon's Sign Rank Sum Test and Mean difference in the VAS scores between the two groups were subjected to



Mann Whitney U test to assess the effectiveness of the two procedures.

Ethical considerations

The study was given ethical approval and clearance by Ethical Review Committee of Vijayanagara Institute of Medical Sciences. All ethical requirements like written informed consent including confidentiality of responses were stringently ensured throughout the study.

RESULTS:

There was no statistically significant difference between the two groups with respect to age and sex of the patients. Both groups were comparable.

Intra group analysis showed that there was statistically significant (P value <0.05) reduction in the mean VAS for pain after treatment in both the groups. Both the treatment techniques were effective in reducing pain and the pain reduction was statistical significant in both the groups.

But the percentage change in reducing the pain was more in Group B (98.4%) compared to Group A (90%).

Inter group analysis showed that Group B was more effective than Group A in reducing pain as there was a statistically significant difference (P value <0.05) in the mean difference of VAS between the two treatment groups.

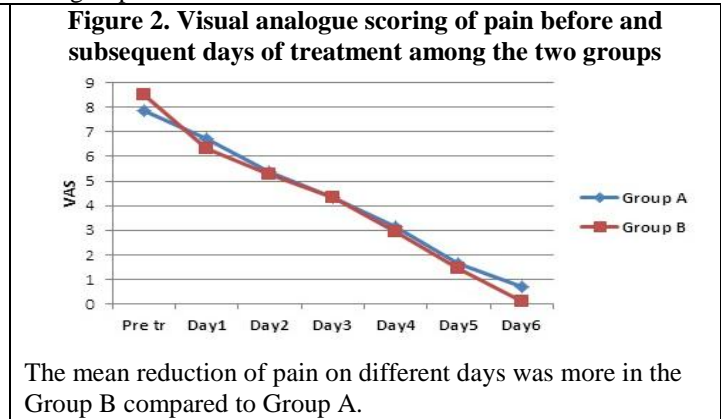
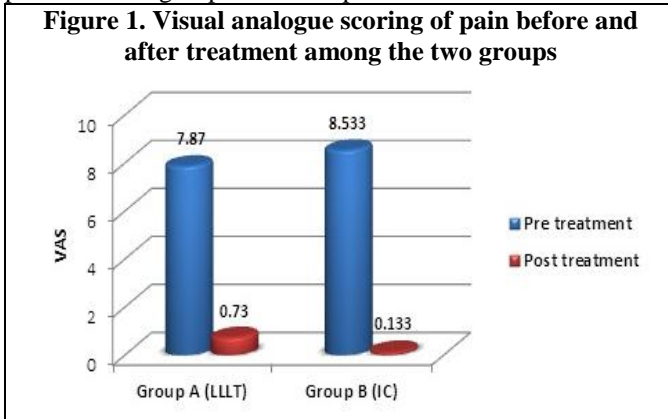


Table 1. Sex and Age wise distribution of the patients among the groups

Variable		Group A		Group B		P value
		Frequency	Percent	Frequency	Percent	
Sex	Male	8	40	7	35	0.757
	Female	12	60	13	65	
Age group	20 - 25 yrs	10	50	9	45	0.763
	26 - 30 yrs	10	50	11	55	
Mean ± SD		25.3 ± 3.45		24.9 ± 3.07		0.7007

Table 2. Intra and Inter group comparison of Visual Analogue scores among two treatment groups

VAS	Group A (LLLT)	Group B (IC)	P value**
	Mean ± SD	Mean ± SD	
Before treatment	7.87 ± 1.16	8.533 ± 0.516	0.0015
After treatment	0.73 ± 0.488	0.133 ± 0.151	
Average difference	7.14	8.4	
Percentage change	90.04%	98.42%	
P value*	0.0001	0.0000	

*Willcoxon’s Signed Rank Test

**Mann Whitney U Test

Table 3. Comparison of Mean Reduction of Pain (VAS) on different days among the two groups

Group	Pre tr	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Group A	7.87	6.73	5.4	4.33	3.13	1.67	0.73
Group B	8.53	6.33	5.27	4.33	2.93	1.47	0.13

DISCUSSION

Myofascial pain is generated by Myofascial trigger points in muscle tissue. Trigger points are thought

to form in response to increased or altered muscle demands include prolonged muscle contraction, such as in



workplace postural errors, proximal nerve compression and resultant muscle spasm and post-trauma (Simons et al., 1998) [13]. There are various studies conducted on the efficacy of physiotherapeutic modalities and manual techniques to relieve pain in Myofascial trigger points. The present study suggested that Myofascial release and deep transverse friction reduce the pain level when tested before and after the treatment ($P < 0.01$) significantly. The study subjects in both the groups were comparable with respect to age and sex. Intra group analysis showed that there was statistically significant (P value < 0.05) reduction in the mean VAS for pain after treatment in both the groups. Both the treatment techniques were effective in reducing pain and the pain reduction was statistically significant in both the groups.

But Inter group analysis showed that Group B was more effective than Group A in reducing pain as there was a statistically significant difference (P value < 0.05) in the mean difference of VAS between the two treatment groups and the percentage change in reducing the pain was more in Group B (98.4%) compared to Group A (90%). The mean reduction of pain on different days was more in the Group B compared to Group A. These findings are supported by the previous studies like, Mark Barnes (1997) [14], describes that the Ischemic compression is a hands on soft tissue technique that facilitates a stretch into the restricted fascia. After few releases tissues will become softer and more pliable. and Hou CR *et al* (2000) [15] concluded in their study on immediate effect of various physical therapeutic modalities on cervical myofascial pain and trigger point sensitivity and they found that ischemic compression therapy provides immediate pain relief and Myofascial trigger point sensitivity suppression.

William P *et al* (2000) [16] studied the effectiveness of home program of ischemic pressure followed by sustained stretch. They conclude that home program consisting of ischemic pressure and sustained stretching is effective in reducing trigger point sensitivity and pain intensity and Fernandez-de-las-Penas C *et al* (2006) [17] they compared two manual treatments (Ischemic Compression and Transverse friction massage) for MTrPs in the upper trapezius muscle. The results were very similar and the authors concluded that the two techniques were equally effective in reducing MTrP pain and tenderness. They also cited a study that found that ischemic compression results are superior to sham treatment. Gemmell H *et al* (2007) [18] did a study to determine immediate effect of ischemic compression, trigger point release technique and ultrasound on pain. He concluded that ischemic compression is superior to sham

ultrasound. And Montanez *et al* (2009) [19] concluded in their study on immediate effect of ischaemic compression and ultrasound for treatment of myofascial trigger points in the trapezius muscle that both the treatment showed an immediate decrease in basal electrical activity of the trapezius muscle, improvement of range of motion of cervical rachis and myofascial trigger point sensitivity of the trapezius muscle gaining short-term positive effects with use of ischaemic compression. Aguilera FJ, Martin DP *et al* (2010) [20] in their case study used a female patient of 27 years old, effectiveness of ischemic compression for deliberate the blockage of blood in trigger point area to increase local blood flow. Their results show that application of ischemic compression is effective in presence of myofascial trigger point pain in neck.

Susan L. Michlovitz (1996) [21] suggested that trigger points can be treated using a variety of techniques including stretch and spray, i.e. massage, deep pressure, ultrasound electrical stimulation and low power laser. The choice of treatment seems to be based upon empiricism and Gam AN *et al* (1998) [22] conducted a study to compare the effectiveness of various physical modalities in the treatment of Myofascial trigger points and concluded that the massage and exercise reduced the trigger point pain.

CONCLUSION

Both LLLT (Low level Laser Therapy) and IC (Ischaemic compression technique) were effective in treating Myofascial pain syndrome patients, although Ischaemic compression technique was more effective than that of Low level Laser Therapy, in terms of reducing pain and number of sessions.

LIMITATIONS

As the few sample patients and skewed distribution between male and female makes it difficult to generalize the scores.

ACKNOWLEDGEMENT

We thank all the study subjects who participated in the study without whom this study would not have been possible. The authors thank all the staff members of Physical Medicine and Rehabilitation department of VIMS Bellary for their guidance and support.

The authors are also grateful to authors/editors/publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

REFERENCES

1. Wolfe F, Smythe HA, Yunus MB, Bennet *et al.* (1990). The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. Re-port of the multicenter criteria committee. *Arthritis Rheum*, 33(2), 160-172.
2. Yunus MB, Holt GS, Masi AT, Aldag JC. (1988). Fibromyalgia syndrome among the elderly. Comparison with younger patients. *J Am Geriatr Soc*, 36, 987-995.



3. Mease P. (2005). Fibromyalgia syndrome, review of clinical presentation, pathogenesis, outcome measures, and treatment. *J Rheumatol Suppl*, 75, 621.
4. Emad Y, Ragab Y, Zeinhom F et al. (2008). Hippocampus dysfunction may explain symptoms of fibromyalgia syndrome. A study with single-voxel magnetic resonance spectroscopy. *J Rheumatol*, 35(7), 1371- 1377.
5. Travell, Janet and David Simons. (1983). Myofascial Pain and Dysfunction, the Trigger Point Manual Volume 1, the Upper Body. Baltimore, MD, Williams and Wilkins.
6. Hiemeyer K, R Luiz and H Menninger. (1990). Dependence of Tender Points upon Posture-a Key to understanding of Fibromyalgia Syndrome. *J Manual Medicine*, 5, 166-174.
7. Han SC and Harrison P. (1997). Myofascial Pain Syndrome and Trigger Point Management. *Regional Anaesthesia*, 22(1), 89-101.
8. Chaiamnuay P, Darmawan J, Muirden KD and Assawatnabodee P. (1998). Epidemiology of Rheumatic disease in rural Thailand, a WHO-ILAR COPCORD study. Community orientated program for the control of rheumatic disease. *Journal of Rheumatology*, 25 (7), 1382-7.
9. Fishbain DA, Goldberg M, Meagher B, Steele R and Rosomoff H. (1986). Male and Female Chronic Pain Patients Categorized by DSM III Psychiatric Diagnostic Criteria. *Pain*, 26, 181-197.
10. Friction JR. (1990). Management of myofascial pain syndromes In, Friction JR, Award EA (eds). *Advances in Pain Research and Therapy*. New York, Raven Press, 325-46.
11. Aral Hakgu" der, Murat Birtane, Su" leyman Gu" rcan, Siranus, Kokino, and Fatma Nesrin Turan. (2003). Efficacy of Low Level Laser Therapy in Myofascial Pain Syndrome, An Algometric and Thermographic Evaluation. *Lasers in Surgery and Medicine*, 33, 339-343.
12. Dimitrios Kostopoulos, Arthur J Nelson, Reuben S Ingber, Ralph W Larkin. (2008). Reduction of Spontaneous Electrical Activity and Pain Perception of Trigger Points in the Upper Trapezius Muscle through Trigger Point Compression and Passive Stretching. *Journal of Musculoskeletal Pain*, 16(4).
13. Simons DG, Travell J Simons LS. (1999). Myofascial pain and dysfunction, In, Travell J, Simons D, (eds). *The trigger points manual*. 2nd edition. Vol.1, Baltimore MD, Lippincott Williams & Wilkins, 1-8.
14. Mark F Barnes. (1997). The basic science of myofascial release, Morphological change in connective tissue. *Journal of Bodywork and Movement Therapies*. 1(4), 231-238.
15. Hou C-R, Tsai L-C, Chung K-C, Hong C-Z. (2002). Immediate effect of various physical therapeutic modalities on cervical myofascial pain and trigger point sensitivity. *Archives of Physical Medicine and Rehabilitation*, 83, 1406-14.
16. William P Hanten, Sharon L Olson, Nicole L Butts and Aimee L Nowicki. (2000). Effectiveness of a Home Program of Ischemic Pressure Followed by Sustained Stretch for Treatment of Myofascial Trigger Points. *Physical Therapy*, 80(10), 997-1003.
17. Fernandez-de-las-Penas Cesar, Cristina Alonso-Blanco, Josue Fernandez-carnero, Juan Carlos Miangolerra-page. (2006). The immediate effect of Ischemic Compression and Transverse friction massage on tenderness of active and latent myofascial trigger points, a pilot study. *Journal of Body work and Movement Therapies*, 10, 3 – 9.
18. Gemmell H et al. (2008). Immediate of Ischemic compression trigger point pressure on neck pain upper trapezes trigger points, a randomized control trial. *Clinical Chiropractic an International Journal*, 11, 30-36.
19. Montañez-Aguilera FJ, Valtueña-Gimeno N, Pecos-Martín D, Arnau-Masanet R, Barrios-Pitarque C, Bosch-Morell F; Changes in a patient with neck pain after application of ischemic compression as a trigger point therapy, Department of Physical Therapy, Universidad CEU-Cardenal Herrera, Valencia, Spain.
20. Aguilera F, Martin DP et al. (2009). Immediate effect of ultra sound and Ischemic compression techniques for the treatment of Trapezius latent myofascial trigger point in healthy subject, a randomized control trial study. *Journal of manipulative and physiological therapeutics*, 32(7), 515-520.
21. Susan BO Sullivan, Thomas J Schmitz. (2001). *Physical Rehabilitation, Assessment and Treatment*, 4th edn, JP Publishers, 425-30.
22. Gam AN et al. (1998). Treatment of Myofascial trigger - points with ultrasound combined with massage and exercise - a randomized controlled trial. *Pain*, 77(1), 73-80.

