

**Original Clinical Research**

Correlation between Improvement in Pain Free Range of Motion of Shoulder and Different Functional Scores Following Trigger Point Injection in Myofascial Pain Syndrome Involving Upper Back

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Abstract

Myofascial pain syndrome (MPS) is a common musculoskeletal disorder associated with myofascial trigger points. Injection of steroid and local anaesthetic at the site is commonly used minimally invasive treatment procedure. Different parameters are used to assess improvement patterns in patients with myofascial pain syndrome, like pain, activity, global assessment score, pain free range of motion and composite scoring systems like University of California, Los Angeles (UCLA) score and Constant Murley (CM) score. This prospective study has been designed to correlate the improvement in pain free range of motion (ROM) of shoulder with other functional scores like activity score, University of California, Los Angeles (UCLA) score and Constant Murley (CM) score after local injection with steroid and local anaesthetic in management of Myofascial Pain Syndrome (MPS) involving upper back. Forty five patients with diagnosed MPS of upper back region were included in the study and were given combination of steroid and local anaesthetic injection. Other noninvasive treatments were same across the groups. Forty patients completed the study. Patients were assessed once before intervention and after 2 weeks and 6 weeks of intervention. The parameters assessed were pain score, patient's global score, physician's global score, activity score, pain free range of motion of shoulder abduction, UCLA score and Constant Murley score. Results were analysed and interpreted using appropriate statistical tests. All parameters demonstrated significant improvement over time. We also found good correlation of ROM with UCLA and Constant Murley score and moderate correlation with activity score.

Keywords: Myofascial Pain Syndrome, Trigger Point Injection, Pain free ROM, UCLA score, Constant Murley score.

Introduction

Myofascial pain syndrome (MPS) is a very commonly encountered problem in the outpatient de-

partment of Physical Medicine and Rehabilitation. People of different economic and social groups are affected by chronic pain of MPS. Upper back

is one of the most commonly involved areas in MPS. Commonly used treatment of this disease includes different pharmacological and non pharmacological approaches as necessary. Injection of steroid and local anaesthetic at the local site or trigger point injection is frequently used minimally invasive treatment procedure in management of MPS where conservative managements fail to alleviate the discomfort.

Myofascial pain syndrome (MPS) is a common musculoskeletal disorder caused by myofascial trigger points. This painful disorder can affect any of the skeletal muscles in the body, but the muscles of upper back and neck are found to be most commonly involved. The pathophysiology of MPS is not completely understood. It is currently hypothesised that trigger points, the most common and characteristic feature of MPS, contain areas of sensitised low-threshold nociceptors (free nerve endings) with dysfunctional motor end plates. The affected muscle with the trigger point usually contains a palpable taut band or nodularity within the muscle belly. The taut band is considered to be a sustained band of contracted muscle. MPS trigger points can be classified as active or latent depending on their clinical characteristics. An active trigger point causes spontaneous pain and is tender to palpation with referred radiating pain. Latent trigger points are tender but not spontaneously painful.^{1,2,3,4}

Management of patients with MPS includes the elimination of chronic overuse or stress injury of affected muscles. A patient's posture, biomechanics, and joint function should be analysed carefully to identify any underlying factors that may have contributed to the development of myofascial pain. Treatment methods include muscle relaxants, NSAIDs, therapeutic exercises, physical modalities, heat or cold modalities, the spray and stretch technique, dry needling, and Trigger Point Injections (TPI) with local anaesthetic, saline, or steroid. Other therapeutic adjuncts to nonpharmacologic or pharmacologic treatments include acupuncture, massage, Transcutaneous Electrical Nerve Stimulation (TENS), and Ultra

Sound Therapy (UST). Use of different exercises like stretching, strengthening, range of motion (ROM) etc, biomechanical correction, home and work environment modification, postural care, use of different physical modalities also have a good supportive role in improvement and sustenance of pain free status in myofascial pain syndrome^{5,6,7}.

There are various assessment scorings for MPS to help document the improvement pattern with treatment of MPS. VAS scoring for pain, Numeric Rating Scale pain score, global score for overall complain by patients and physician etc. give a fairly measurable picture of pain and discomfort associated with MPS. Activity score takes account of the ease or difficulty in the basic and instrumental activities of daily living (BADL and IADL) that is hampered by the chronic MPS. There are a few composite scores also which considers pain, activity, ROM, strength, hand positions and patient satisfactions among other criteria. These composite score helps detect the overall improvement of the patient rather than just decrease of pain. University of California, Los Angeles (UCLA) score and Constant Murley (CM) score are two such scoring systems that are commonly used as outcome assessment tools for MPS.⁸

A good number of studies have stressed on the effectiveness of trigger point treatment by different agents in myofascial pain syndrome.^{9,10,11 12} A number of studies also highlighted the effective use of steroid and anaesthetic in trigger point injection.^{13,14,15,16} There are different studies that provide statistical data about significant improvement in pain, ROM, activity and other composite scores like UCLA and Constant Murley score after trigger point injection with steroid and local anaesthetic in patients with MPS.^{17,18,19,20,21} A study is also there that correlates the improvement in different parameters of assessment after injection. The correlation with Constant Murley score came out as moderate to good.²²

But no study has been found in the literature which correlates the improvement in pain free shoulder ROM with that of composite scores like

UCLA and CM, the scores having ROM itself as one of the components. It may be interesting to observe the correlation between ROM alone and the composite scores having ROM as one of their integral parameters.

Aims and Objectives

The study is designed to observe the correlation between the improvement of ROM and improvement in activity score, UCLA score and Constant Murley score in addition to assess the effect of local steroid and local anaesthetic injection into trigger points.

Materials & Methods

This Prospective Study was conducted in the Department of Physical Medicine & Rehabilitation, N.R.S. Medical College & Hospital, Kolkata.

Approval from the Institutional Ethical Committee for the study and Informed consent from all patients included in the study were obtained. Forty five patients of myofascial pain syndrome involving upper back as diagnosed on the basis of diagnostic features of myofascial pain syndrome²³ [Table 1] attending departmental OPD were selected for the study. Patients with hypothyroidism, anaemia, bone disorders, neuromuscular conditions, radiculopathy, trauma, inflammatory conditions, cardiac conditions, generalised fatigue, depression, local or systemic infections, diabetes and with contraindications of steroid and local anaesthetics were excluded from the study.

All patients were treated with NSAIDs, muscle relaxant, TCA (Amitriptyline 25mg), stretching exercise and local heat. Patients were assessed as per assessment criteria. Then patients received local steroid and local anaesthetic injection at trigger point along with needling. All patients were assessed utilising outcome assessment tools⁸ [Table 2] as per study protocol before injection (0 week) and 2 weeks and 6 weeks after injection.

Then resultant data from 3 assessments were analysed with appropriate statistical tools as applicable like Kolmogorov-Smirnov goodness-of-fit

test, Friedman ANOVA, Dunn's Multiple Comparison Test, Spearman's rank correlation.

Results

Forty five patients participated in the study. After five dropped out in the follow up, the study was completed with forty patients.

Mean age of the study population was 42.33 years with age ranging from 18 years to 60 years. Among those 40 patients in the study thirty six were female and other four were male patients. Thirty three out of total thirty six female patients were homemaker and other three were students. Among those four male patients three were in desk job and one was driver. 14 patients had bilateral involvement where as other 26 patients had unilateral involvement. Among those patients with unilateral involvement 16 had involvement on the right side and other 10 had left sided involvement. All patients were right handed.

In analysis by Friedman's ANOVA followed by Dunn's test for multiple comparisons all the parameters of assessment such as pain [Table 3], patient's global score [Table 4], physician's global score [Table 5], ROM [Table 6], activity score [Table 7], UCLA score [Table 8] and Constant Murley score [Table 9] have shown statistically significant improvement at first follow up (0-2 weeks) and over the total period (0-6 weeks) of study. But in between first and second follow up (2-6 weeks) all parameters have shown decrement. Except in ROM, decrements in all parameters are statistically significant.

Spearman's Rank Correlation between improvement of ROM and activity score over the total period of study (0-6 weeks) was moderate (rho value- 0.430) [Figure 1] [Table 10]. But, correlation of ROM improvement with UCLA [Figure 2] [Table 11] and Constant Murley score [Figure 3] [Table 12] improvement over the total period of study (0-6 weeks) were both good with rho value as 0.671 and 0.585 respectively. Correlation between improvement in UCLA and Constant Murley score was also good (rho- 0.851). [Table 13]

Table 1: Diagnostic Features of Myofascial Pain Syndrome

- A. Features that must be present to diagnose myofascial pain syndrome
 1. Taut band within the muscle
 2. Exquisite tenderness at a point on the taut band
 3. Reproduction of the patient's pain by stimulating the taut band at the trigger point
- B. Features helpful, but not required, for diagnosing myofascial pain syndrome
 1. Local twitch response (important to elicit by needling when treating by injection or deep dry needling)
 2. Referred pain (common and a cause of many myofascial pain syndromes)
 3. Weakness
 4. Restricted range of motion
 5. Autonomic signs, eg, skin warmth or erythema, tearing, piloerection (goose-bumps)

Table 2: Outcome Assessment Tools

1. Pain
2. Patient's Global score
3. Physician's Global score
4. Pain free range of motion (ROM) of shoulder joint as measured by goniometry
5. Level of activity score
6. UCLA score
7. Constant-Murley score
8. Patients Global Assessment
9. Physicians Global Assessment

Table 3: Pain

Dunn's Multiple Comparison Test	Difference in rank sum	P value
Pain0 vs Pain2	72.000	< 0.001
Pain0 vs Pain6	42.000	< 0.001
Pain2 vs Pain6	-30.000	< 0.01

Table 4: Patient's global score

Dunn's Multiple Comparison Test	Difference in rank sum	P value
PtGlobal0 vs PtGlobal2	72.000	< 0.001
PtGlobal0 vs PtGlobal6	42.000	< 0.001
PtGlobal2 vs PtGlobal6	-30.000	< 0.01

Table 5: Physician's global score

Dunn's Multiple Comparison Test	Difference in rank sum	P value
PhyGlob0 vs PhyGlob2	69.500	< 0.001
PhyGlob0 vs PhyGlob6	44.500	< 0.001
PhyGlob2 vs PhyGlob6	-25.000	< 0.05

Table 6: Range of Motion (ROM)

Dunn's Multiple Comparison Test	Difference in rank sum	P value
ROM0 vs ROM2	-61.000	< 0.001
ROM0 vs ROM6	-41.000	< 0.001

ROM2 vs ROM6	20.000	ns
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Table 7: Activity score

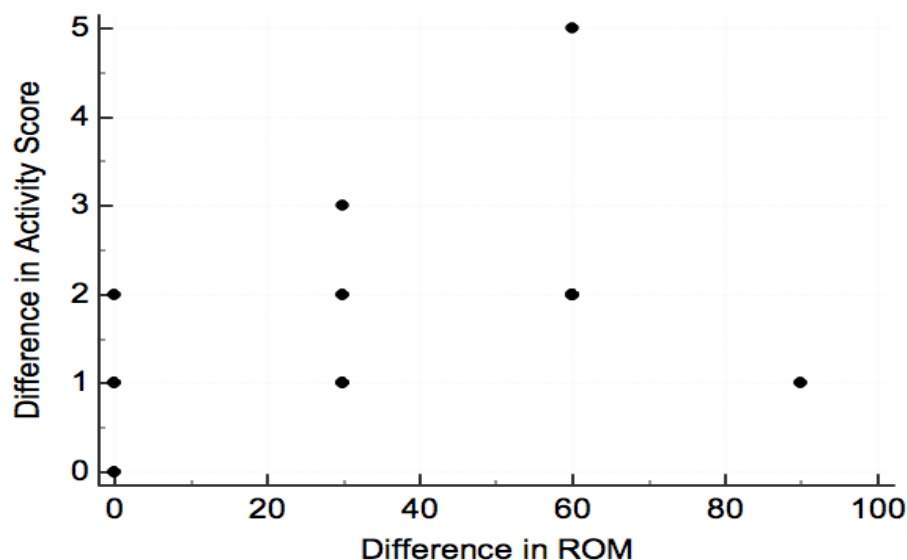
Dunn's Multiple Comparison Test	Difference in rank sum	P value
ActSc0 vs ActSc2	-73.500	< 0.001
ActSc0 vs ActSc6	-40.500	< 0.001
ActSc2 vs ActSc6	33.000	< 0.001

Table 8: UCLA score

Dunn's Multiple Comparison Test	Difference in rank sum	P value
UCLASc0 vs UCLASc2	-75.000	< 0.001
UCLASc0 vs UCLASc6	-45.000	< 0.001
UCLASc2 vs UCLASc6	30.000	< 0.01

Table 9: Constant Murley score

Dunn's Multiple Comparison Test	Difference in rank sum	P value
CMSc0 vs CMSc2	-78.000	< 0.001
CMSc0 vs CMSc6	-42.000	< 0.001
CMSc2 vs CMSc6	36.000	< 0.001

Correlation between improvements in ROM and Activity Score**Figure 1****Table 10**

Sample size	40
Spearman's coefficient of rank correlation (rho)	0.430 (moderate correlation)
Significance level	P=0.006
95% Confidence Interval for rho	0.137 to 0.654

Correlation between improvements in ROM and UCLA Score

Figure 2

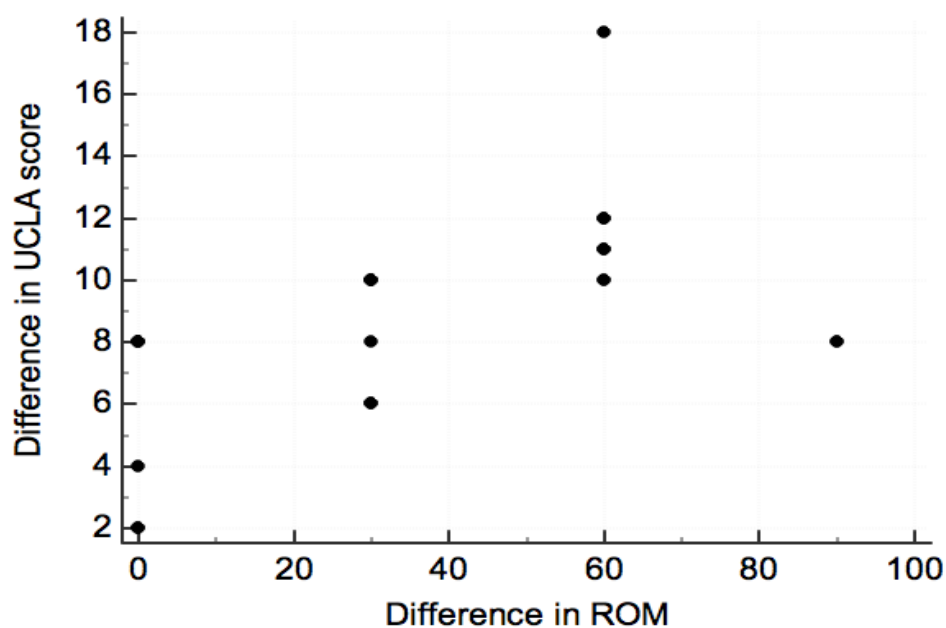


Table 11

Sample size	40
Spearman's coefficient of rank correlation (rho)	0.671 (good correlation)
Significance level	P<0.0001
95% Confidence Interval for rho	0.454 to 0.813

Correlation between improvements in ROM and Constant Murley Score

Figure 3

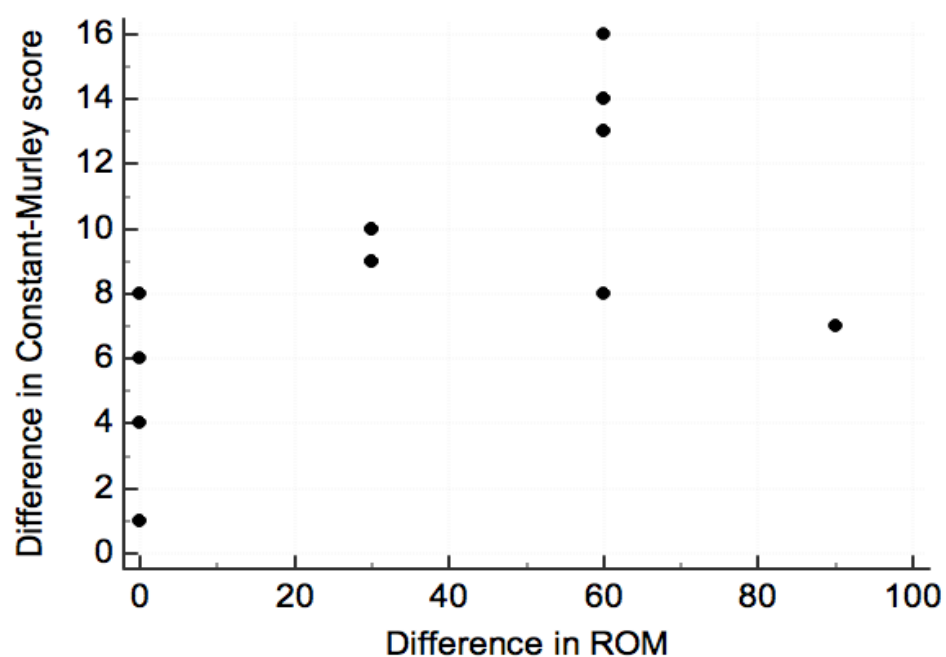


Table 12

Sample size	40
Spearman's coefficient of rank correlation (rho)	0.585 (good correlation)
Significance level	P=0.0001
95% Confidence Interval for rho	0.334 to 0.758

Correlation between improvements in Constant Murley Score and UCLA Score**Table 13**

Variable Y	DiffUCLASc
Variable X	DiffCMSc
Filter	Group=2
Sample size	40
Spearman's coefficient of rank correlation (rho)	0.851 (good correlation)
Significance level	P<0.0001
95% Confidence Interval for rho	0.735 to 0.919

Discussion

The number of drop outs from the study was five or 11%. This attrition is normal along the general 5-10% rate in any prospective study.

This finding of mean age of the sample group in early forties highlights the fact that MPS is more prevalent in this middle age group person. Commonly, people of this age group take moderate to heavy work load either in professional field or in domestic scenario. That may have led to increased incidence of MPS in this age group. This data corresponds with demographic profile of other national and international studies in similar field.

In a study conducted in Kolkata by Jaiswal et al¹⁷ on trigger point injection in MPS the mean age group of the study group was 44.8 years and the range was 21-67 years. Bron et al⁷ in their study of in treatment of myofascial trigger point assessed the mean age of the study group as 42.8 years.

In our study percentage of female patient was 90%. It clearly shows a female preponderance in the incidence of MPS. In their study, Lugo et al¹⁸ found 85% female in total study group. Bron et al⁷ and Lee et al¹¹ in their respective studies also

found out skewed male female ratio with clear female preponderance similar to our study.

Among those female patients most of them were home makers with their activity level restricted to domestic chores. This signifies that house hold chore put workload enough to produce symptomatic MPS. Six patients were found to be working long hours in sitting posture either due to study or desk job at work place. That highlights the fact that sitting in same posture with faulty ergonomics either for studying or for work may also lead to development of MPS.

In our study we observed an increased incidence on right side in right handed persons. It signifies the relation of increased workload on the dominant working hand to development of MPS.

All the parameters of our study like pain, patient's global score, physician's global score, ROM, activity score, UCLA score and Constant Murley score have shown significant improvement for initial two weeks. Improvement also stayed significant when compared between the commencement of the study on the day of injection and the end of study after six weeks.

Other similar studies by Jaiswal et al¹⁷, Lugo et al¹⁸, Hong et al¹⁹, Mohammed et al²⁰ and Lee et

al²¹ have all shown significant improvement in study parameter over the period of follow up.

The significant decrement in parameters between first and second follow up highlights the fact that the improvements in parameters are best seen in initial two weeks after the trigger point injection. After that condition tends to decline instead of further long term sustained improvement.

In our study when we compared the improvement patterns of ROM with that of UCLA score and Constant Murley score for the entire period of study from initial visit to final follow up, the correlation was good on both occasions. This good correlation between simple ROM assessment and composite scales like UCLA score and Constant Murley score underlines the reliability of these scoring systems in assessment of symptomatic improvement in the treatment of MPS. This significant correlation also indicates towards the important association between clinical and functional outcome tools as well as their usefulness in clinical set up. The moderate correlation between ROM and activity score for the same period probably underlines the fact that activity does not always only depends on pain free range of motion but also on a lot of other different factors.

Similarly in a study conducted by Razmjou et al²² good correlation of Constant Murley score with clinical findings of ROM was found.

In our study good correlation between two composite scores UCLA and Constant Murley signifies the ability of these composite scores to highlight the actual clinical improvement pattern in similar fashion.

Conclusion

In our prospective study involving patients of upper back MPS with representative age and gender distribution, all parameters showed significant improvement in initial two weeks. But a gradual decline over the next four weeks was noted, though the improvement never came back to the baseline. The correlation between improvement in ROM with UCLA and Constant Murley score was good. Correlation between these two composite

scores was also good. This underlines the ability of these scoring systems to correctly reflect the clinical improvement after treatment in similar pattern.

Sample size of our study was small and there was no control group to compare for the effectiveness of the treatment. Another study with larger sample size and with a control group may help to validate our inferences.

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