Original Article

Management of Myofascial Pain Syndrome in Armed Force Personnel: Two Novel Therapeutic Approach

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Abstract

Background : Myofascial pain syndrome is one of the commonest pain syndromes now a days. Its pathophysiology is not fully documented or understood. Goal of treatment is to release the pain and discomfort of myofascial pain syndrome.

Methods: This was a multicentric prospective study comprising 70 patients who had been diagnosed clinically with myofascial pain syndrome in the neck, shoulder or back. Cases were randomly divided into two treatment groups. First group (36 cases) were treated with physiotherapy modalities (extracorporeal shock wave therapy and ultrasound therapy as combination therapy) and patients in second group (34 cases) were treated with trigger point injection. In both the groups patients were advised stretching exercises as soon as pain decreases.

Results : Pain was substantially decreased in both the treatment groups but results were early and comparatively better in patients treated by trigger point injection group. Stretching exercises were helpful in regaining strength and also helpful in decreasing recurrence of pain.

Key words: **Myofascial pain, stretching exercises, treatment, trigger point, US therapy**

Introduction:

Myofascial pain syndrome (MPS) is a common cause of pain and dysfunction in the musculoskeletal system. It accounts for 20% to 95% of patients with musculoskeletal pain presenting at general medical clinics and pain management centres[1-2].

Myofascial trigger points (MTrPs) are hyperirritable spots in skeletal muscle associated with palpable nodules in the taut bands of muscle fibres. When these palpable nodules are stimulated mechanically, local pain and referred pain can be induced together with visible local twitch response[3-4].

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Although pathophysiology of MPS has not been completely understood, recent studies suggest that injured muscle fibres caused by overuse provide less oxygen and nutrition, and these deficiencies cause involuntary contractions[5] of the muscles and development of MTrPs. Female sex has been shown to be one of the important factors contributing to the development of MPS[6].

Each muscle has a characteristic elicited referred pain pattern that, for active MTrPs, is familiar to the patient. Without a laboratory test or imaging method, diagnosis of MTrPs depends entirely on history and physical examination. MTrPs are usually identified by digital palpation. The diagnostic skill required depends on considerable innate palpation ability, authoritative training, and extensive clinical experience. In a recent study[7], it was confirmed that this technique is a reliable method for detecting MTrPs in shoulder muscles. Although prevalence studies are sparse[1,8-10], based on clinical experience, MTrPs seem to be associated with shoulder pain, disability, and dysfunction[11,12]. Till date, little is known about the impact of MTrPs on pain and functioning in patients with shoulder disorders[13]. Because MTrPs refer pain to the shoulder, they may contribute substantially to the clinical picture of shoulder pain.

There are various treatments for MTrPs such as dry needling, local injection, and ischacmic compression, stretching exercises, massage, many physiotherapy modalities and others[14-16]. Trigger Point (TrP) injection is one of the effective methods in MPS treatment and generally yields very good results[5] if performed correctly. Main objective of injection treatment is to localise TrPs and inactivate them.

The aim of this study is to examine the outcome measures of physiotherapy modalities like extracorporeal shock wave therapy (ESWT) and ultrasound (US) therapy in combination followed by stretching exercises and intramuscular trigger point injection followed by stretching exercises as a primary treatment option in patients with MPS.

Materials and Methods:

We performed a multicentric prospective study on 70 patients (26 females and 44 males) who had been diagnosed clinically with MPS in the neck, shoulder or back muscles. Patients were randomly divided into two groups: 36 patients in first group and 34 patients in the second group. Both the groups were almost same in physical parameters like age, sex, gender and with duration of pain. Patients were also explained about the nature of disease, available treatment options and possible outcome.

Thirty-six patients in first group were treated with seven cycles of (ESWT) US therapy whereas thirty -four patients in second group were treated with single dose trigger point injection (1 ml methylprednisolone and 1 ml 2% Lignocaine). In both the groups stretching/ strengthening exercises were started immediately after pain relief.

Pain intensity and pain threshold were evaluated clinically on visual analogue scale (VAS), tenderness grading scale (TGS) and shoulder pain and disability index (SPADI) just before starting treatment, at fifteenth day and after three months interval.

VAS (Fig 1) is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured[17]. It is often used in epidemiologic and clinical research to measure the intensity or frequency of various symptoms[18].

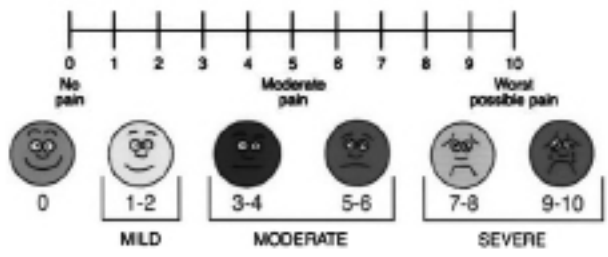

Fig 1- *Visual Analogue Scale (VAS) for Pain*

The "tenderness grading scale" (Table 1) is a proposed grading system for the soft tissue tenderness[19].

Table 1: *Tenderness Grading Scale*

Tenderness grade	Severity of symptom
0	No tenderness
1	Tenderness to palpation without grimace or flinch
2	Tenderness with grimace and or flinch to palpation
3	Tenderness with withdrawal (+ "Jump sign")
4	Withdrawal (+ "Jump sign") to non-noxious stimuli (i.e.superficial palpation, pin prick, gentle percussion)

The SPADI was developed to measure current shoulder pain and disability in an outpatient setting. The SPADI contains 13 items that assess two domains; a 5- (Table 2) item subscale that measures pain and 8-item subscales (Table 3) that measur disability[20].

Table 2: *Pain Scale: Severity of Pain*

At its worst?	0	1	2	3	4	5	6	7	8	9	10
When lying on theinvolved side?	0	1	2	3	4	5	6	7	8	9	10
Reaching for something on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Touching the back of your neck?	0	1	2	3	4	5	6	7	8	9	10
Pushing with the involved arm?	0	1	2	3	4	5	6	7	8	9	10

Total pain score _____/50 x 100 = _____%

(Note: If a person does not answer all questions divide by the total possible score eg, if 1 question missed divide by 40)

Table 3: *Disability Scale*

Washing your hair?	0	1	2	3	4	5	6	7	8	9	10
Washing your back?	0	1	2	3	4	5	6	7	8	9	10
Putting on an undershirt or jumper?	0	1	2	3	4	5	6	7	8	9	10
Putting on a shirt that buttons down the front?	0	1	2	3	4	5	6	7	8	9	10
Putting on your pants?	0	1	2	3	4	5	6	7	8	9	10
Placing an object on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Carrying a heavy object of 10 pounds	0	1	2	3	4	5	6	7	8	9	10
Removing something from your back pocket?	0	1	2	3	4	5	6	7	8	9	10

Total disability score: _____/ 80 x 100 = _____%

(Note: If a person does not answer all questions divide by the total possible score eg, if 1 question missed divide by 70)

Total SPADI score: _____/ 130 x 100 = _____%

(Note: If a person does not answer all questions divide by the total possible score, eg if 1 question missed divide by 120)

Inclusion Criteria:

Those patients who fulfilled the following criteria were included in the study:

1. Age group 20-60 years.
2. Had normal physical and neurological examination results.
3. A well-defined, tender, hypersensitive, palpable nodule located within a taut band of the neck, shoulder or back muscles.
4. A typical referred pain pattern.
5. A local twitch response elicited by snapping palpation of the MTrP.
6. Chronic pain > 3 months duration.

Exclusion criteria:

Those patients with the following comorbid conditions/ treatment history were excluded from the study:

1. Responding to medical treatment.
2. Using analgesics/antidepressants regularly.
3. Pregnant women with known allergies against local anaesthetics.
4. History of malignancy.
5. History of cervical and cranial surgery.
6. Signs of cervical disc prolapse, systemic disorder or migraine.
7. Anaemia and bleeding diathesis.
8. Major psychiatric disorders (major depression etc).
9. Patients who used antipsychotic, antidepressant and anti-epileptic drugs within the previous 3 months.
10. Neuromuscular dysfunction.
11. Uncontrolled hypertension, hypothyroidism or hyperthyroidism.
12. Patients with diffuse muscular pain upper and lower back or a known case of fibromyalgia.

Treatment Protocols:

Patients in first group were started with ESWT (500 impulses to the taut band and 200 impulses to the surrounding area at 0.056 mJ/mm2 daily) followed by therapeutic US therapy (U/S head size- 1cm, continuous mode, variable Intensity according to pain threshold but generally within 1.5 watts/cm2, Range- 0.1 to 1.5 watts/ cm2, Treatment time- 5 minutes). After 3 days of treatment when patients were symptomatically better stretching exercises were started. The above treatment was continued for 7 days. From 8th day onwards the physiotherapy modalities (ESWT and US therapy) were stopped and patients were advised home based stretching exercise programme (2-3 times/day). Patients were also advised not to take any analgesics. All the patients were also advised to do gentle ice compression to prevent post exercise soreness. Patients were reviewed after 15 days and at 3 months post-treatment.

Patients in second group were given trigger point injection methylprednisolone (1 ml 40 mg /ml) and 2% lignocaine (1 ml) through same 2 ml syringe. They were reviewed after 3 days and those who were symptomatically better stretching exercises were started immediately. Those who were still symptomatic or with very less relief in pain, stretching exercises were delayed by 2-3 days. Patients were advised not to take any analgesics and also advised to continue stretching exercises twice/thrice daily followed by ice compression. Patients were again reviewed on 15th day and at 3 months post-treatment.

In those cases where there is no relief/aggravation of pain after treatment transdermal patch/tablet diclofenac sodium was used for 2-3 days. Nineteen cases in first group and twenty-four cases in second group used some form of analgesic (tablet/transdermal) patch for pain relief.

Results:

Data were entered in MS excel and analysed using SPSS version 16.0. Summary statistics mean, standard deviation, median, minimum and maximum were calculated for VAS, TGS and SPADI scores at baseline, 15 days and 3 months. Change from baseline to 15 days and 3 months were also calculated for all these scores. Chi-square test of independence was applied to test is there any age and genderwise difference in allotment of patients in group A and group B. t-test for means was used to test the difference in VAS, TGS and SPADI scores from baseline to 15 days, and 3 months. Both the statistical tests were applied at 95% level of significance.

Table 4: *Demographic Characteristics at Baseline*

Demographic characteristics	Group A (n=36)	Group B (n=34)	p-value
Age category (years) :			
< 30	15 (41.7%)	6 (17.6%)	0.120
31-40	10 (27.8%)	11 (32.4%)	
41-50	13 (19.4%)	13 (23.5%)	
>50	23 (11.1%)	21 (26.5%)	
Gender:			
Female	13 (36.1%)	13 (38.2%)	0.854
Male	23 (63.9%)	21 (61.8%)	

Note: Chi-square test of independence applied

Table 4 shows age and genderwise distribution of patients in group A and group B. About 70% and 50% patients were aged 40 years or below in group A and group B respectively. About 38% females and 62% males were in both group A and group B. There was no significant association of age and genderwise distribution of patients in group A and group B.

Table 5: *Summary and Analysis of Mean VAS Score at Baseline and Change from Baseline*

VAS sure	Group A (n=36)	Group B (n=34)	P-value
VAS - baseline:			
Mean (SD)	7 (1)	7 (1)	0.208
Median	7	7	
Minimum, maximum	6, 8	6, 8	
VAS - 15 days:			
Mean (SD)	3 (1)	2 (1)	0.039
Median	3	2	
Minimum, maximum	2, 4	1, 4	
VAS - change from baseline to 15 days:			
Mean (SD)	-4.5 (0.56)	-5.09 (1.11)	0.006
Median	-5	-5	
Minimum, maximum	-5, -3	-7, -3	
VAS - 3 months :			
Mean (SD)	2 (1)	1 (1)	<0.0001
Median	2	1	
Minimum, Maximum	1, 4	0, 4	
VAS - change from baseline to 3 months :			
Mean (SD)	-4.97 (0.45)	-5.97 (1.29)	<0.0001
Median	-5	-6	
Minimum, maximum	-6, -3	-8, -3	

Note: Independent t-test applied

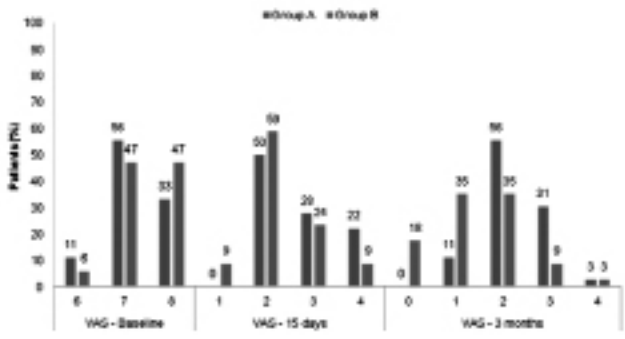

Fig 2- *Groupwise Distribution of Patients (%) with VAS Score at Baseline, 15 Days and 3 Months*

Table 5 and (Fig 2) show summary and analysis of VAS scores at baseline ie, pretreatment, at 15 days and at 3 months. At baseline, less than 10% patients had VAS score 6 in both groups, 56% patients had VAS score 7 and 33% patients had VAS score 8 in group A. While in group B, 47% patients had VAS score 7 and 8 each. Mean VAS score at baseline was 7 in both the groups.

After 15 days, mean VAS score was 3 in group A and 2 in group B. Minimum and maximum VAS scores were 2 and 4 in group A and 1 and 4 in group B respectively. VAS score from baseline to 15 days was significantly decreased in group B (p=0.006) as compared to group A patients. 50% patients of group A and 68% patients in group B had VAS score ≤ 2 after 15 days.

Further decreased in VAS score was observed in both the groups after 3 months of the treatment. Mean VAS score was 2 in group A and 1 in group B. Minimum and maximum VAS scores were 1 and 4 in group A and 0 and 4 in group B respectively. VAS score from baseline to 3 months was significantly decreased in group B (p<0.0001) as compared to group A patients. Fig 2 shows that more than 50% patients of group B had VAS score ≤ 1 after 3 months while only 11% patients of group A had VAS score ≤ 1 after 3 months.

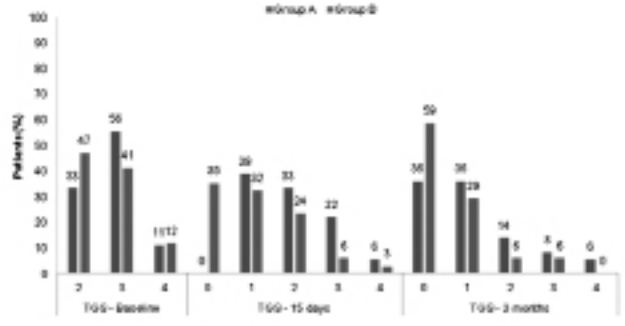

Fig 2- *Groupwise Distribution of Patients (%) with VAS Score at Baseline, 15 Days and 3 Months*

Table 6: *Summary and Analysis of Mean TGS Score at Baseline and Change from Baseline*

TGS Score	Group A (n=36)	Group B (n=34)	P-value
TGS - baseline			
Mean (SD)	3 (1)	3 (1)	0.413
Median	3	3	
Minimum, maximum	2, 4	2, 4	
TGS - 15 days:			
Mean (SD)	2 (1)	1 (1)	0.001
Median	2	1	
Minimum, maximum	1, 4	0, 4	
TGS - change from baseline to 15 days:			
Mean (SD)	-0.83 (0.51)	-1.56 (1.35)	0.004
Median	-1	-2	
Minimum, Maximum	-2, 0	-4, 2	
TGS - 3 months:			
Mean (SD)	1 (1)	1 (1)	0.037
Median	1	0	
Minimum, Maximum	0, 4	0, 3	
TGS - change from baseline to 3 months:			
Mean (SD)	-1.67 (0.76)	-2.06 (1.23)	0.110
Median	-2	-2	
Minimum, maximum	-3, 0	-4, 1	

Note: Independent t-test applied

Table 6 and (Fig 3) shows summary and analysis of TGS scores at baseline, 15 days and 3 months. At baseline, about 90% patients had TGS score 2 or 3 and about 10% patients had score 4 in both the groups. Mean TGS score at baseline was 3 in both the groups.

After 15 days, mean TGS score was 2 in group A and 1 in group B. Minimum and maximum TGS scores were 1 and 4 in group A and 0 and 4 in group B respectively. TGS score from baseline to 15 days was significantly decreased in group B (p=0.004) as compared to group A patients. Fig 2 shows that in group B, more than 30%

patients had TGS score 1 or 2 each and 35% patients had 0 TGS score after15 days of the treatment. While in group A, only 40% patients had TGS score 1 after 15 days.

Further decreased in TGS score was observed in both the groups after 3 months of the treatment. Mean TGS score was 1 in group A and 0 in group B. Minimum and Maximum TGS scores were 0 and 4 in group A and 0 and 3 in group B respectively. TGS score from baseline to 3 months was decreased in group B patients. However this change from baseline to 3 months was not significant as compared to group A patients. Figure 3 shows that about 60% patients of group B had TGS score 0 after 3 months while in group A only 36% patients had TGS score 0 after 3 months.

Table 7: *Summary and Analysis of Mean SPADI Score at Baseline and Change from Baseline*

SPADI score	Group A (n=36)	Group B (n=34)	p-value
SPADI - baseline:			
Mean (SD)	80 (12)	85 (13)	0.117
Median	80	90	
Minimum, maximum	60, 100	60, 110	
SPADI - 15 days:			
Mean (SD)	53 (10)	38 (11)	<0.0001
Median	50	40	
Minimum, maximum	40, 80	20, 70	
SPADI - change from baseline to 15 days:			
Mean (SD)	-26.67 (9.56)	-46.47 (15.55)	<0.0001
Median	-30	-50	
Minimum, maximum	-50, -10	-70, -20	
SPADI - 3 months:			
Mean (SD)	25 (11)	20 (13)	0.106
Median	20	20	
Minimum, maximum	10, 50	0, 50	
SPADI - change from baseline to 3 months:			
Mean (SD)	-55 (13.2)	-64.41 (19.7)	0.021
Median	-60	-70	
Minimum, maximum	-80, -30	-100, -30	

Note: Independent t-test applied

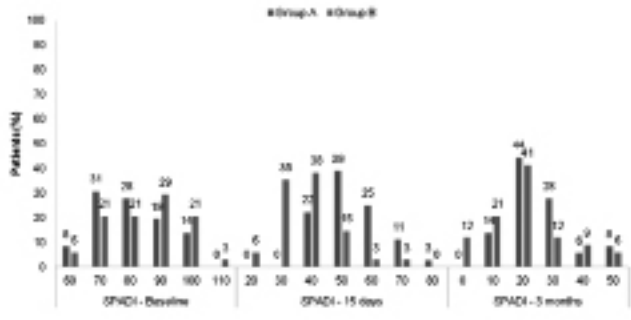

Fig 4 - *Groupwise Distribution of Patients (%) with SPADI Score at Baseline, 15 Days and 3 Months*

Table 7 and (Fig 4) show summary and analysis of SPADI scores at baseline, at 15 days and at 3 months. At baseline, more than 90% patients had SPADI score 70 and above in both groups.

After 15 days, mean SPADI score was 53 in group A and 38 in group B. Minimum and Maximum SPADI scores were 40 and 80 in group A and 20 and 70 in group B respectively. From baseline to 15 days, SPADI score was significantly decreased in group B ($p<0.0001$) as compared to group A patients. Figure 4 shows that, 22% patients of group A and 80% patients in group B had SPADI score ≤ 40 after 15 days of treatment.

Further decreased in SPADI score was observed in both the groups after 3 months of the treatment. Mean SPADI score was 25 in group A and 20 in group B. Minimum and maximum SPADI scores were 10 and 50 in group A and 0 and 50 in group B respectively. SPADI score from baseline to 3 months was significantly decreased in group B ($p=0.021$) as compared to group A patients. Figure 4 shows that about 60% and 75% patients in group A and B had SPADI score ≤ 20 after 3 months respectively.

Discussion:

MPS is classified as a local pain syndrome which is characterised by local tenderness, myofascial pain trigger points and typical referred pain, and is known to be a very common clinical syndrome. Neck and shoulder pain is common[21] with an estimated point prevalence of nearly 13% and a lifetime prevalence of 50%. The most typical symptom of MPS is local and radicular pain. There is a lack of specific diagnostic criteria for MPS. Electrodiagnostic and morphological findings have been identified; however, they cannot be practically applied in the clinical setting due to cost and time constraints. This adds to the difficulty of definitive treatment, particularly when considering elusive

underlying pathology and persistent MTrPs.

Different conservative management of mechanical neck pain has been tested in the literature but with conflicting results and at present no treatment strategy is generally accepted[22]. The most common treatment methods for MPS include medical therapies, superficial and deep heating modalities, electrotherapy, stretch and spray techniques, acupuncture, local injections, massage, and exercise.

The application of two therapeutic modalities simultaneously and at the same site is reported in the literature and described as combination therapy. The most widely used conservations are US therapy and transcutaneous electrical nerve stimulation (TENS). The use of combination therapy is to enhance the effect of one therapy upon the other making the combination more effective than either of the therapy alone.

There are not many published studies that have analysed the effects of combination therapy of ESWT and US therapy and trigger point injection in the treatment of active MTrPs. This study revealed immediate decrease in pain and discomfort in both the treatment groups but the results were comparatively better in trigger point injection group.

Srbely and Dickey[23] performed therapeutic US on a group for 5 minutes applying a frequency of 1 MHz with an intensity of 1.0 W/cm2 in a continuous mode. Control group received a non-therapeutic dose of US (5 minutes, 1 MHz, 100 mW/cm2, in a continuous mode). The results indicate that the therapeutic use of US can significantly reduce MTrPs sensitivity of the trapezius muscle, while this in not the case with a non-therapeutic use. Concerning the decrease of the MTrPs sensitivity we coincide with this study.

The use of high power ultrasound is recommended as clinical therapy for chronic MTrPs. In the literatures that support the use of ultrasound it was found that the pain relief was due to its assuming thermal and mechanical effect. Draper *et al*[24], in their study has put forward the beneficial effect of thermal ultrasound and has stated that the thermal ultrasound technique over latent trigger points is comfortable and can decrease stiffness of a trigger point.

Gam *et al*[25] found no difference between groups given conventional ultrasound or sham ultrasound in the treatment of MTrPs in the neck and shoulder. This trial has shown evidence for the positive effect of therapeutic ultrasound in improving lateral flexion of neck and a reduction in the perceived level of pain.

Trigger point injection is well known to be an effective treatment for MPS. Ceccheerelli *etal*.[26] compared needling at skin level of trigger points with needling in deeper muscle layer and insisted that the latter is more efficient. Cummings and White[27] reported that stimulation at the trigger point itself causes pain relieving effects regardless of injected agents. In this study, we also identified significant pain reliefs after local injections therapy and this result is consistent with that of previous studies.

Conclusions:

MPS is a common cause of pain and discomfort in the neck and upper limbs. Though different treatment options are available but none is proven to be very effective till date. This study revealed immediate decrease in pain and discomfort in both the treatment groups but the results were comparatively better in trigger point injection group. The use of combination therapy is to enhance the effect of one therapy upon the other making the combination more effective than either of the therapy alone. Stretching exercises if started early showed improved long term outcome and less chances of recurrence of pain and discomfort. The pain of MPS is a manageable condition if diagnosed and treated early.

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