

Effectiveness of Intramuscular Electrical Stimulation on Myofascial Pain Syndrome in Patients with Shoulder Pain

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Abstract: Background: Myofascial pain syndrome is defined as the pain derived from myofascial trigger points which are hyperirritable nodules located within a taut band of muscle.

OBJECTIVES: To check the effectiveness of intramuscular electrical stimulation on Myofascial pain syndrome in patient with scapular pain.

METHODS: Fifteen subjects who were diagnosed with Myofascial pain syndrome (MPS) at our outpatient department were treated with intramuscular electrical stimulation through dry needling (DN/IMES) on infraspinatus and teres minor muscle active trigger points. We include patients of 18-30 years of age. Measure was taken pre and post treatment in each subject. These measures include pain sensation by numerical pain rating scale (NPRS) and range of motion (ROM) by goniometer and patient satisfaction.

RESULTS: Fifteen patients treated with intramuscular electrical stimulation were in the follow up period. Comparison of the post treatment result in Intramuscular electrical stimulation showed that NPRS and ROM was significant improved.

CONCLUSION: Intramuscular electrical stimulation was associated with rapid pain relief and improve ROM, patient satisfaction and was proved to be practical for treatment of Myofascial pain syndrome.

Keywords: Intramuscular electrical stimulation, Dry needling, Myofascial pain syndrome, NPRS, ROM.

1.INTRODUCTION

Myofascial pain syndrome (MPS) is a common and characteristic musculoskeletal disorder that causes chronic pain in several parts of the body [1]. MPS is defined as the pain derived from myofascial trigger points [1,2], which are hyperirritable nodules located within a taut band of muscle. These are often thought to be caused by motor endplate dysfunction, in addition to biochemical and vascular change that led to MPS [2]. Which are usually extremely tender on palpation. Pain may refer to distant area may be

accompanied by sensory disturbance and autonomic phenomenon [3]. A trigger point is painful point within muscle contracture or taut band in muscle belly, which is aggravated by a directly applied force, pressure, contraction, or stretching [4]. Taut band is a palpable rope-like hardening of muscle bearing a Myofascial Trigger Point (MTrP)[6]. A trigger point can cause limited Range of Motion (ROM), referred pain, reduced functional ability or weakness, stiffness, motor dysfunction [4]. MTrPs found in one or more muscle and connective tissue [5]. Trigger points may be active or latent. Active trigger point cause spontaneous pain and may lead to satellite trigger point formation whereas latent ones are asymptomatic unless palpated firmly. Latent trigger point can develop into active ones as a result of psychological stress, poor posture, sudden injury, muscle overload, repetitive micro trauma [3]. Most common muscles for the trigger point are infraspinatus and teres minor muscle. The trigger point in these muscles is accompanied with many disorders. The MTrP in these muscles are common condition among patients with shoulder complaint, neck pain [6,7].

MTrP and MPS have been treated with several therapeutic modalities including therapeutic ultrasound, ischemic compression techniques, stretching, manipulation, dry needling (DN). DN is one of the standard interventions, to achieve pain relief, muscle relaxation and increase range of motion. IMES is a minimally invasive electrotherapeutic method used to deliver impulse into the muscle for achieving therapeutic benefits such as pain relief, movement re-education, relaxation [7]. High frequency 50-100 pulses per second to inhibit sensory nerves and motor nerves, relieves spasm of the muscles and blood vessels and pain relief. Low frequency 2-5 pulses per second induce the contraction of muscles and enhance the tension of the muscles and

ligaments, reduce paralysis and injury of the muscles [8].

Several investigations have reported that IMES can be an effective modality on musculoskeletal pain. However, few relevant studies could be found which reported effect of the IMES on myofascial trigger points [10]. Several researchers were done the study of myofascial pain syndrome, but there is lack of study that shows the effectiveness of DN/IMES on MPS on the infraspinatus and teres minor muscles. This study will help in evaluating a better physiotherapy treatment intervention in case of MPS. It will also aid new dimension of treatment for MPS and it will also motivate many researchers for study in MPS with musculoskeletal association. It could be help younger generation to get right information and treatment of MPS.

2.METHODOLOGY

- A. *Study design:* This study was Experimental study design and approved by the institutional Review Board of Gurugram University.
- B. *Study area:* The study was conducted in the Department of Physiotherapy, Gurugram University, Gurugram Haryana
- C. *Study Period:* The study was conducted from May 2022 to July 2022
- D. *Inclusion Criteria:*
 - Age 18-30 years.
 - Both male and female.
 - Active trigger points located in one or both infraspinatus and teres minor muscle.
 - Participants who was willing to participate in the study.
 - Pain was scored between 0 to 8 according to NPRS.
- E. *Exclusion Criteria*
 - Earlier shoulder surgeries.
 - Shoulder pain with neurological symptoms.

- Shoulder trauma.
- Dermatological infections.
- Radiating pain from neck to full upper extremity.

F. *Data collection procedure:*

The study was done to check the effectiveness of intramuscular electrical stimulation on myofascial pain syndrome. 15 subjects in the study were taken i.e., those who received intramuscular electrical stimulation through dry needling. NPRS and Range of motion of shoulder were recorded before giving the intervention. The participants in the performed intramuscular electrical stimulation through dry needling 2 sessions per week for 3 weeks. The post data was calculated on end of 3rd week. Result revealed that showed improvement, however significant improvement was noted. DN/IMES reduced the score of NPRS and improved range of motion of shoulder and patient satisfaction. The treatment was found to be more effective in the patient with Myofascial pain syndrome.

G. *Data analysis*

The data were collected and entered in Microsoft excel sheet and were analyzed using statistical package for social science (SPSS) version 26. Data within each group were analyzed using a Wilcoxon signed ranked test looking at change from baseline to 3 weeks.

3.RESULTS

Table.1. Distribution of intramuscular electrical stimulation with dry needling according to gender

Gender	Dry Needling with Intramuscular electrical stimulation
Female	5(33.0%)
Male	10(67.0%)

In the present study, there were 15 participants included. In table no. 1 shows that the intramuscular electrical stimulation with dry needling according to gender, the males were 67% and remaining 33% were females.

Table.2. Distribution of intramuscular electrical stimulation with dry needling parameters according to pre&post intervention

Dry Needling with Intramuscular electrical stimulation	Pre	Post	z-value	p-value
NPRS				
Median (IQR)	5(7-4)	2(2-1)	-3.446	0.001**
Range (Max-Min)	5(8-3)	3(3-0)		
Range of Motion of Abduction				
Median (IQR)	3(4-3)	4(4-4)	-2.810	0.005**

Range (Max-Min)	2(4-2)	1(4-3)		
Range of Motion of External Rotation				
Median (IQR)	2(3-1)	3(3-3)	-2.889	0.004**
Range (Max-Min)	2(3-1)	1(3-2)		

IQR- Interquartile Range; Max- Maximum value; Min-Minimum Value;

**-. Significant at 0.01 level of significance.

According to table no.2, it reveals the comparison of pre and post intervention in dry needling with intramuscular electric stimulation, the NPRS scale median value for pretest was found to be 5 and after intervention it was comes at 2, Wilcoxon signed ranked test was applied and the results were significant at 0.01 level of significance.

For Range of Motion of abduction movement, the median value at pretest was 3 and after intervention it was going to 4. The result was significant at 0.01 level of significance.

Similarly for Range of Motion of external rotation movement, the pretest score was carried out to be 2 median and after intervention, it was 3 with 3-3 IQR, Z-value was calculated using Wilcoxon signed rank test as -2.889 and the results were significant at 0.01 level of significance.

Table.3. Distribution of satisfaction of participants with intramuscular electrical stimulation of dry needling.

Satisfaction	Intramuscular electrical stimulation with dry needling
Satisfied	14(93.0%)
Unsatisfied	1(7.0%)

In our study, table no. 3 represents the satisfactory scale for giving treatment to the participants. Approx. 93% participants satisfied from dry needling with intramuscular electric stimulation treatment.

4.DISCUSSION

The current study provided evidence of reduction of pain and improve function with use of DN/IMES. Similar findings were found in the study conducted by Kindlye Brennan et al (2021) [2]. Another study conducted by Jodie M. Rock et al (2014) [11]found that with the use of DN and IES, immediate reduction in pain and free ROM was improved.In our study we found that DN/IMES was more effective of the treatment of pain caused due to MPS. Similar findings were found in the study conducted by Juan Rodriguez-

Mansilla et al (2016) [12]. The studies included were randomized controlled trials written in English and/or Spanish about the effectiveness of DN /IMES on pain and ROM in individuals with MPS. In our study, we found that DN/IMES significantly improved range of motion of shoulder external rotation and abduction. Similar findings were found in the study conducted by Sukumar Shanmugam et al (2021) [7]. Our study also supports a study done by SayenaVahidimanesh et al (2019) [13] found that intramuscular electrical stimulation through dry needling might be effective on improving pain and range of motion in patients with shoulder impingement syndrome. Assess the effective of intramuscular electrical stimulation in reducing hemiplegic shoulder pain. So, a study done by Johan Chae et al (2005) [14] the study concluded that intramuscular electrical stimulation reduce shoulder pain and effects is maintained for >12 month of post treatment and VAS and ROM showed improvement in all five patients one week after intramuscular electrical stimulation through dry needling.

5.CONCLUSION

The study concluded that Dry needling with intramuscular electrical stimulation was very effective in reducing pain with good patient satisfaction, myofascial trigger points deactivation and improving the external rotation and abduction range of motion of shoulder. We suggest that dry needling with intramuscular electrical stimulation to manage the signs and symptoms of Myofascial pain syndrome in regular clinical practice.

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