A Comparative Study of Effectiveness between Myofascial Release and Pressure Release on Pain and Ankle Range of Motion in Adults with Soleus Myofascial Trigger Points

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Abstract: *Study Design:* Experimental study design.

Background: Myofascial release and Pressure release are the two techniques used for the treatment of active myofascial trigger points. To our knowledge there are no prospective, randomized studies in the literature investigating the comparison between the effects of 2 different manual therapy techniques (myofascial release and pressure release) on myofacsial trigger points of soleus.

Purpose of the study: To determine the effects of Myofascial release and Pressure release techniques on pain and ankle range of motion in patient with soleus myofascial trigger point.

Method: 30 subjects having active myofascial trigger points in soleus muscle were randomly assigned to either control group or experimental group. Readings were taken for Pain using Numeric Rating Scale (NRS) and ankle dorsiflexion range of motion (ROM) with goniometer before treatment and immediately after treatment.

Results: Data analysis was performed using SPSS software 17 version. In both the group significant improvement occurred in NRS score and ROM. Between groups analysis revealed that there was no significant difference in NRS score and ROM between both groups.

Conclusion: Both manual therapy techniques i.e. Myofascial release and Pressure release were found to be effective in reducing pain and increasing ankle dorsiflexion range of motion. However the subjects treated with myofascial release and pressure release showed similar benefit in terms of reduction of pain on NRS and improved ROM. Hence it's concluded that Myofascial release and Pressure release both are effective therapeutic option in the treatment of myofascial trigger point.

Keywords: Myofascial release, Trigger points, Pressure release, 10 point Numerical Rating Scale (NRS), Soleus muscle.

INTRODUCTION

Myofascial trigger point (MTrPs) are claimed to be a common source of musculoskeletal pain in people presenting to manual therapists for treatment. Simons *et al.* defined myofascial trigger point as hypersensitive tender spots associated with a taut band of a skeletal muscle that is painful on compression and on stretch and gives rise to a typical referred pain pattern [1].

Myofascial trigger point is classified into active and latent trigger points. An active trigger point is a symptom-producing myofascial trigger point and can trigger local or referred pain. A latent myofascial trigger point does not trigger pain without being stimulated [1].

MTrPs are typically located by physical examination and palpation. The diagnosis of a MTrP is accomplished by physical exploration by physical therapist, who must take into account the physical signs demonstrated, including: presence of a palpable taut band in a skeletal muscle; the presence of a hypersensitive tender spot in the taut band; palpable or visible local twitch response on snapping palpation, and/or needling of the MTrP; a 'jump' sign; the presence of the typical referred pain pattern of the MTrP; restricted range of motion (ROM) of the affected tissues; muscular fatigue and autonomic phenomena. However, the reliability of these criteria has been questioned [1-3].

Simons *et al*. and Gerwin *et al*. recommend that the minimum acceptable criterion for the presence of an active trigger point diagnosis involves the combination of the presence of:

- A palpable taut band
- An exquisite tender spot in the taut band
- Patient's recognition of pain as 'familiar'
- Pain on stretching the tissues [4].

Myofascial therapy can be defined as "the facilitation of mechanical, neural, and psycho physiological adaptive potential as interfaced *via* the

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myofascial system." This Inclusive definition attempts to acknowledge the wide variety of techniques currently taught under the myofascial signature, Myofascial procedures vary significantly, ranging from prolonged stretching and soft tissue mobilization to subtle indirect techniques [5].

An adequate ankle range of motion (ROM) is considered a necessary component for functional activities such as running, ascending and descending stairs and normal gait. A disturbance of ankle ROM, resulting from muscle tightness during gait, may affect not only the ankle-foot complex, but also the remaining joints of the lower extremities. Chronic myofascial pain in the calf muscles has been documented to cause a biomechanical abnormality of gait, resulting in an excessive knee flexion angle during the stance phase of gait. Adequate ankle dorsiflexion ($>10^0$) is required in midstance for the tibia to advance over the foot and allow forward body movement. If this ankle ROM is restricted by tight musculature, compensation may occur in the form of genu recurvatum, early knee flexion, early heel lift or excessive pronation at the subtalar joint [6].

METHODS

Design

Pre-test post-test experimental group design was carried out with a sample of 30 participants of active myofascial trigger points of soleus muscle. Participants were randomly allocated using sealed envelope method to receive either Myofascial release technique or Pressure release. Informed consent was taken from all the participants included in the study.

Subjects

The sample size was 30 subjects. Subjects were randomly divided into two groups. Group A &B with 15 subjects in each group. Inclusion criteria – both male and female, subject in the age group between 18-30years, unilateral restriction in active ankle dorsiflexion, patients having myofascial trigger point in the soleus muscle. exclusion criteria -symptoms and signs of fibromyalgia, myofascial trigger point injections or receiving physical medicine in the year preceding this study, history of acute trauma, history of inflammatory joint or muscle disease, infection, knee ROM less than 90^0 in prone line.

INTERVENTION

Group A was given Myofascial release Group B was given Pressure release.

Group A-Patient is lying in prone position and ankle outside the couch. Patient is in relaxed position. One pillow is placed under the forehead and arms. Therapist stands in walk standing towards the foot of patients. Apply the stretch on calf muscle with the help of thigh and then apply a Gross Stretch of the Soleus by the fist on either side of the muscle belly, to apply a stretch upward [7].

Group B- Pressure release was performed according to the technique described by Simons *et al*. and employs the barrier release concept. The participant was positioned prone with both legs extended. The researcher would slowly apply increasing pressure with the thumb on the marked soleus MTrP site until the first increase in tissue resistance was felt (barrier). This point was usually perceived as tender but not painful by the subject. Pressure was maintained until the clinician felt a release in muscle tension under the palpating thumb. This process was repeated for approximately 60 seconds consecutively for each taut band identified, unless the MTrP was deactivated prior to this time or the participant requested the treatment to be discontinued. The intervention was 3 min, if all 3 MTrPs were identified for treatment [6].

OUTCOME MEASURES

Pain was measured by 10 Point Numerical Rating Scale (NRS).

Ankle dorsiflexion was measured by using two-armed, 360^0 plastic goniometer. All the readings were taken on baseline and immediately after intervention.

RESULTS

Analysis of the data collected for NRS and ankle dorsiflexion ROM of 30 subject was done by statistical analysis tests using SPSS and software version 17. The results were considered and statistically significant at $p<0.05$.The characteristics of the data were presented through Tables and Graphs. T-test was used to analyse inter-group differences in NRS and ROM readings before and after performing the intervention. Paired sample t-test was used to compare the intra-group differences in NRS and ROM readings before and after intervention.

Within Group Analysis of NRS Score

The mean value ± SD of NRS for subjects in group A was 5.73 ± 1.03 on baseline and on post-treatment was 3.86± 0.74 (Table **1**) and for group B was 5.60±

1.29 on baseline and on post-treatment was 4.20±0.94 (Table **2**). The within group analysis of the NRS showed that there was a significant difference in both the groups between the pre and post readings in Group A (Myofacial release) and Group B (Pressure release). Paired sample t-test revealed that there was a significant decrease in pain after treatment in both the groups ($p < 0.001$).

Table 1: Comparison of Change in NRS within Group A

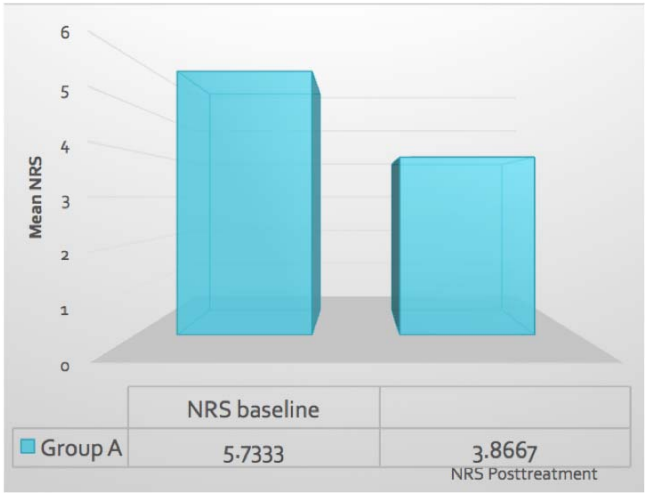
Group A	NRS baseline	NRS post treatment	p value
Pair 1	5.73 ± 1.03	3.86± .74	0.001**

Pair 1-Difference of mean score of NRS from baseline to post treatment.
**p < 0.001(Highly significant).

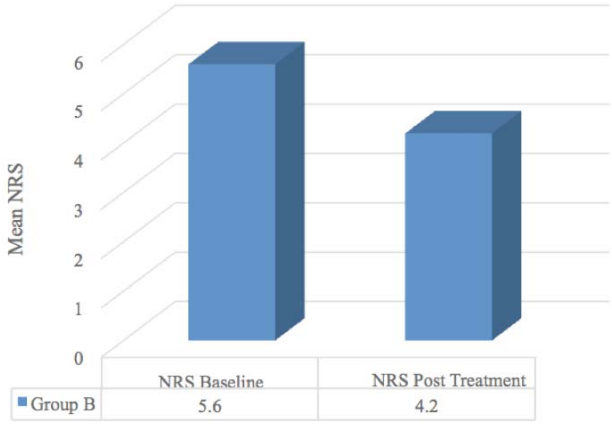
Table 2: Comparison of Change in NRS within Group B

Group B	NRS Baseline	NRS Post Treatment	p value
Pair 1	5.60± 1.29	4.20± 0.94	< 0.001**

Pair 1- Difference of mean score of NRS from baseline to post treatment.
**p < 0.001(Highly significant)



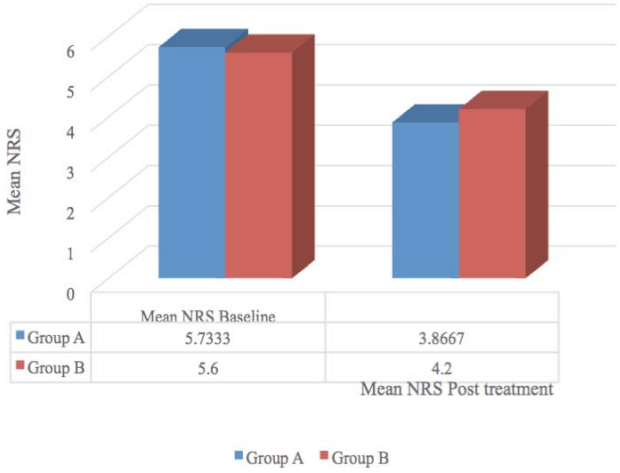
Graph 1.1: Comparison of change in NRS within group A.



Graph 1.2: Comparison of change in NRS within group B.

Between Group Analysis of NRS Scores

The mean value ± standard deviation of NRS for subjects in group A was 5.73 ± 1.03 on baseline and on post-treatment was 3.86 ± 0.74 and the mean value ± standard deviation of NRS for subjects in group B was 5.60 ± 1.29 on baseline and on post-treatment was 4.20 ± 0.941 (Table **3**). Between group analysis of NRS showed that there was no significant difference in the NRS scores before treatment (0.653) and after treatment (0.096) as $p > 0.05$ is not significant.



Graph 1.3: Comparison of NRS among both groups before and after treatment.

Table 3: Between Group Comparison of NRS

	Group	Mean	t value	p value
NRS Baseline	A B	5.73 ± 1.03 5.60± 1.29	0.45	0.65^{NS}
NRS Post Treatment	A B	3.86± 0.74 4.20± 0.94	-1.78	0.096^{NS}

*p < 0.05(significant).
NS- Not Significant.

Within Group Analysis of Ankle ROM Score

The mean value ± standard deviation of ankle dorsiflexion ROM for subjects in group A was 11.00 ± 2.44 on baseline and post-treatment was 14.60 ± 2.58 (Table **4**) and for group B was 9.80 ± 5.45 on baseline and post-treatment was 14.20 ± 4.60 (Table **5**). The within group analysis of ankle dorsiflexion ROM in both group showed that there was a significant increase in ankle dorsiflexion ROM post treatment in both the groups ($p < 0.001$).

Table 4: Comparison of Change in ROM within Group A

Group A	ROM Baseline	ROM Post Treatment	p value
Pair 1	11.00± 2.44	14.60± 2.58	< 0.001**

Pair 1- Difference of mean score of ROM from Baseline to Post treatment.

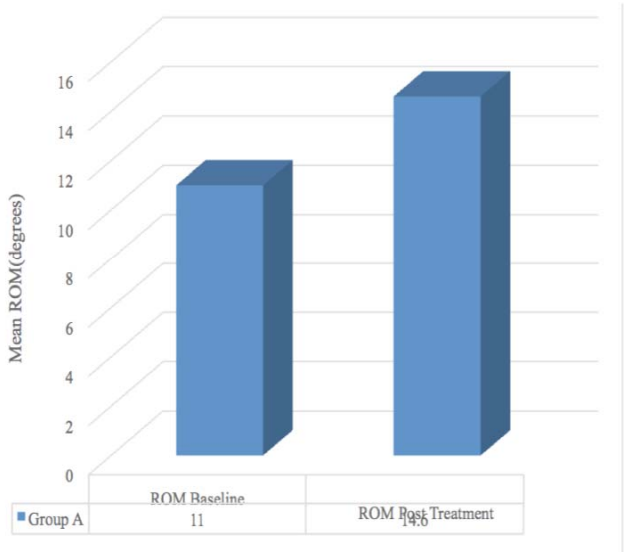
**p < 0.001(Highly significant).

Table 5: Comparison of Change in ROM within Group B

Group B	Mean ROM Baseline	Mean ROM Post Treatment	p value
Pair 1	9.80± 5.45	14.20± 4.60	< 0.001**

Pair 1- Difference of mean score of NRS from baseline to post treatment.

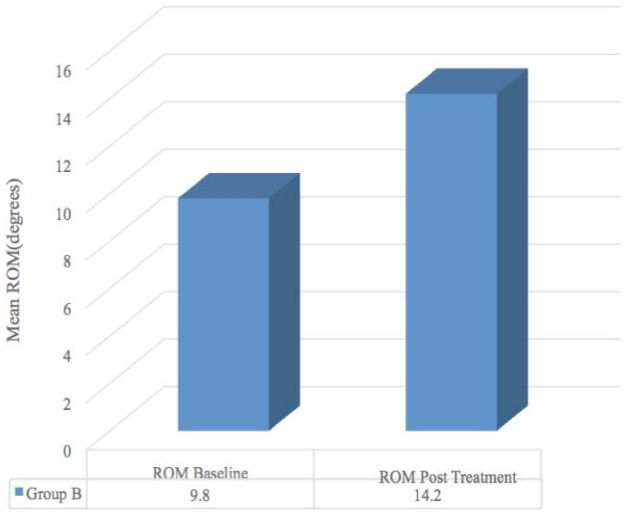
**p < 0.001(Highly significant).



Graph 1.4: Comparison of change in ROM within group A.

Between Group Analysis of ROM Scores

The mean value ± standard deviation of ankle dorsiflexion ROM for subjects in group A was 11.00 ± 2.44 on baseline and post-treatment was 14.60 ± 2.58 and the mean value ± standard deviation of ankle dorsiflexion for subjects in group B was 9.80± 5.45 on baseline and on post-treatment was 14.20± 4.60 (refer Table **5.7** and Graph **5.7**). Between groups analysis there was no significant difference before treatment (0.535) and after treatment (0.800) as $p > 0.05$ is not significant.



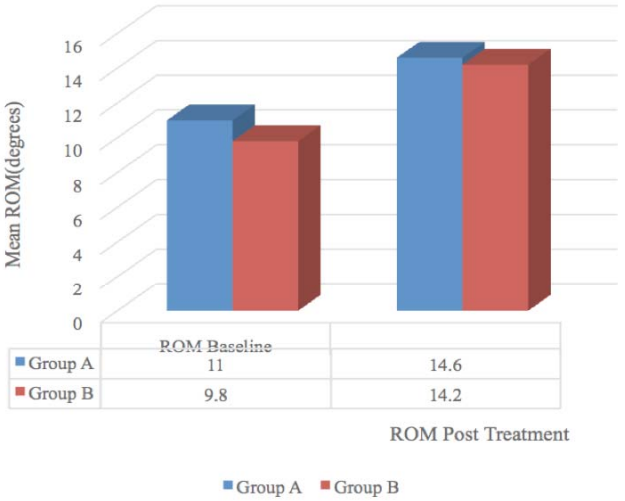
Graph 1.5: Comparison of change in ROM within group B.

Table 6: Between Groups Comparison of Ankle Dorsiflexion ROM

	Group	Mean	t value	p value
ROM Baseline	A B	11.00± 2.44 9.80±5.45	0.637	0.535 NS
ROM Post Treatment	A B	14.60± 2.58 14.20± 4.60	0.259	0.800 NS

**p < 0.001 (Highly significant).

NS- Not Significant.



Graph 1.6: Comparison of ROM among both groups before and after treatment.

DISCUSSION

The study compared the effectiveness of the two techniques that is Myofascial release and Pressure release in improving pain and ankle dorsiflexion ROM in adults with Myofascial trigger points in soleus muscle. The subjects in this study had similar baseline values of all dependent variables suggesting that all groups had homogenous distribution of patients. The results of this study revealed that although both treatment techniques were effective in reducing pain and improving ROM but statistically there was no significant difference between both groups at the end of the treatment suggesting that both treatment techniques can be effective therapeutic option in the treatment of myofascial trigger point.

The results of our study are in accordance with the results of previous studies. Manheim Carl (2001), in his study concluded that Myofascial release technique releases the fascia restriction which causes pressure in the fibrous band of connective tissue. It causes capillary dilation and an increased in the blood flow to the muscle which in turns increase the removal of waste products that causes stimulation of nociceptors pain fibers there by reducing pain, muscle tension and improving range of motion [8].

Simons (2004) proposed an integrated hypothesis of the aetiology of myofascial trigger point, where acute or chronic muscle overload result in trauma to the motor endplates and subsequent release of acetylcholine. Excessive amounts of acetylcholine result in the formation of contraction knots (areas of localized sarcomere shortening) which are in a state of continued contraction and result in local ischaemia and hypoxia. The combination of increased energy demand in the face of loss of energy supply causes the release of sensitizing noxious substances, which are proposed to be responsible for the pain associated with myofascial trigger point. Autonomic effect can modulate the increased acetylcholine release and contribute to the positive feedback cycle [1].

According to Kostopoulos *et al*. (2004) Pain reduction with Myofascial release technique in myo-fascial trigger point may result from reactive hype-raemia in the local area, due to counter-irritant effect or a spinal reflex mechanism that may produce reflex relaxation of the involved muscle. The treatment of Myofascial trigger point involves lengthening of the sar-comeres, which reduces the energy consumption and in turn will cease the release of noxious substance [9].

Richard Shacksnovis (2002), in his study concluded that Myofascial release increases blood circulation helping the muscle to achieve an energetically adequate metabolic state. Restoration of aerobic metabolism increase adenosine triphosphate supply and enhances myofilament interaction in the previously myofascial active loci. This process of restoration of proper muscle cell metabolism and function may be responsible for the decrease of excess acetylcholine in the synaptic cleft and postsynaptic membrane [10].

Rob Grieve *et al.* (2009) in his study has indicated that a single treatment of TP pressure release has showed an immediate significant increase in active ankle dorsiflexion. Although the overall treatment effect size of ankle ROM was smaller than may be clinically significant. The ankle ROM value in the control group decreased from pre- to post measurement, whereas the mean change in ROM value for the intervention group improved [6].

William P Hanten *et al.* (2012) in a study demonstrated the effectiveness of ischemic pressure followed by sustained stretching in reducing trigger point sensitivity and pain intensity scored with a VAS. Direct comparison of these results with the results found in other TP treatment experiments is only possible in a general way due to different treatment techniques, subject populations, measurements taken, duration of treatment, and time between treatment cessation and post test measurement [11].

The clinical implications of increased ankle ROM after only one treatment would include cost effectiveness and patient satisfaction. Of further clinical relevance, is the inadequate rehabilitation of dorsiflexion ROM which may lead to long term-term pain and ankle instability.

Limitations of Study

1. The sample size was small.
2. There were no follow up.
3. Only trigger point in the soleus was evaluated.

Relevance to Clinical Practice

The study provides therapists with the evidence on which to base their judgment of the effectiveness of the myofascial release and pressure release with respect to pain, disability, ROM, Muscle length in patients with active myofascial trigger point.

Thus, it reinforces that either Myofascial release and Pressure release can be used as an adjunct to physiotherapy program in the management of myofascial trigger point.

Future Research

Future research can be done with a large group of samples including subjects with different age groups.

The merits associated with the long term effects of Myofascial release and Pressure release with the same treatment period, were not examined in this study due to time constraints. So, future research may include a follow up of 2-4 month so as to verify the long term effects of the treatment program which may be beneficial for the patients who have myofascial trigger point.

Future research is also needed to see whether the Myofascial release and Pressure release treatment if continued for a longer period of time can reduce more pain, disability and increase range of motion.

CONCLUSION

This study compared the effectiveness of Myofascial release and Pressure release in decreasing pain and increasing ankle ROM and it is concluded that pain decreased significantly and ankle ROM increased in both groups. But there is no significant difference between both groups with respect to pain and ankle ROM.

Hence based on the result of the study, our null hypothesis i.e. there will not be any significant difference between Myofascial release technique and Pressure release technique on pain and ankle dorsiflexion range of motion in patient with soleus myofascial trigger point has been accepted.

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