

# Comparison of Active Release Technique and Positional Release Therapy for Gastrosoleus Trigger Point Release in Recreational Runners

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## ABSTRACT

**Background:** Running frequently hypertrophies the gastrocnemius and soleus muscles as propulsion in running gait is primarily performed by the calf muscle complex which leads to concomitant inflexibility of these muscles. Tightness of these muscles in turn leads to the formation of trigger points within the muscles. Active Release Technique (ART) is the combination of site specific manual pressure with precise patient movement (lengthening the muscle through the ROM). Positional Release Therapy (PRT) increases the flexibility of muscle by keeping the muscle in shortened position for a period of 90 secs while maintaining a sustained manual pressure.

**Objective:** To compare effect of Active Release Technique and Positional Release Therapy for gastrosoleus trigger point release in recreational runners using NRS and active dorsiflexion ROM using universal goniometer.

**Method:** 30 subjects were selected as per inclusion and exclusion criteria and were randomly allocated into 2 groups of 15 each. Group A received Active Release Technique and Group B received Positional Release Therapy for the gastrocnemius and soleus muscles. Pre and post intervention dorsiflexion range of motion and NRS scores were analysed.

**Result:** The statistical analysis showed that there is a significant increase in the range of motion and a significant reduction in the pain scores post trigger point release in both the groups ( $p < 0.0001$ ). However, inter group analysis showed that Group B is much more effective in improving the range of motion and reducing pain scores.

**Conclusion:** The present study concluded that Positional Release Therapy is a better intervention for the release of trigger points as it shows a greater increase in ankle dorsiflexion range of motion and a significant reduction in pain.

**Keywords:** Active Release Technique (ART), Positional Release Therapy (PRT), Recreational runners, Gastrocnemius, Soleus

## INTRODUCTION

Running has become an increasingly popular form of exercise over the last 30 years, particularly among recreational runners, due to its cardiovascular, relaxation, socialisation and fitness benefits. Propulsion in running gait is primarily performed by the calf muscle complex, i.e. the gastrocnemius and soleus muscles. [1] Running frequently hypertrophies the gastrocnemius and hamstring muscle

groups, with concomitant inflexibility of these muscles. Tightness of these muscles in turn leads to the formation of trigger points within the muscles. [2]

Simons et al. defined the trigger points as the presence of exquisite tenderness at a nodule in a palpable taut band of muscle. They are able to produce referred pain, either spontaneously or on digital compression. Additional complaints include reduced joint range of motion. [3]

Trigger points are clinically classified as:

Active: Active trigger points are those that may be responsible for the presenting pain complaint. They may also be associated with less readily definable symptoms such as weakness, paresthesia, or temperature changes, and they may have associated referred pain.

Latent: Latent trigger points present with muscle shortening, and pain occurs only on the application of external pressure. These trigger points may become activated by a variety of stimuli, including poor posture, overuse, or muscle imbalance. [4]

Trigger points form in the muscle's fibres, close to the motor end plate (neuromuscular junction). Excess acetylcholine (ACh) is released at the synapse, usually associated with overuse or strain, leading to release of calcium. Resulting ischemia creates an O<sub>2</sub> deficit and energy crisis. Without available ATP, calcium ions, which are keeping the gates open for ACh to keep flowing, cannot be removed. Actin-myosin filaments shorten in the area of the motor endplate. A contracture "knot" forms the characteristic trigger point nodule. The remainder of the sarcomeres of that fibre are stretched, creating the palpable taut band. [5] The gastrocnemius and soleus muscles are prone to develop trigger points as these are antigravity muscles and are most active during the propulsion phase of the running cycle. During activities such as running, jumping etc these muscles have a tendency to undergo shortening due to repeated overuse.

Active gastrocnemius MTrP symptoms may include nocturnal night cramps, whereas active soleus MTrPs are reported to include referred heel pain and restricted ankle dorsiflexion range of movement (ROM). [6]

Studies conducted have shown the effectiveness of various therapies for the release of trigger points such as ischemic compression release, myofascial release (MFR), dry needling, deep transverse friction massage, etc.

### Active Release Technique(ART)

It is the combination of site specific manual pressure with precise patient movement (lengthening the muscle through the ROM) that makes ART unique to other manual therapy techniques.

Patient's active movement puts the A in ART. Trained therapists use their hands to evaluate the underlying soft tissue. The various conditions that may benefit from ART include headaches, plantar fasciitis, sciatica, shin splints, tennis elbow. [7]

### Positional Release Therapy(PRT)

Positional Release Therapy is also known as strain counter strain therapy i.e. manual therapy which increases the flexibility of muscle by keeping the muscle in shortened position for further muscle relaxation. PRT positions the muscle in position of comfort for a period of 90 seconds while maintaining a sustained manual pressure. [8]

There is scarcity of literature on the use of these two techniques on the gastrocnemius and soleus muscles for release of trigger points and hence this study is undertaken.

## **MATERIALS AND METHODS**

The study was a comparative study where 30 recreational runners were selected using convenient sampling. Inclusion Criteria: Runners willing to participate in the age group of 20-30 years and the ones having atleast one hypersensitive tender nodule within a palpable taut band in the gastrocnemius or soleus muscle, runners having ankle dorsiflexion range of motion less than 20 degrees, pain intensity of more than 4 on NRS, subjects running for 3 to 4 days per week for more than 6 months. Exclusion criteria: Fibromyalgia syndrome, congenital deformity of the foot and ankle, Tumours, Lower limb fractures, Diabetic neuropathy, Peripheral vascular disease, recent injuries to the foot or ankle. An informed consent was taken from each subject in the language best understood by him. Materials used in the study included

universal half circle goniometer, plinth, paper and pen.

**Procedure:**

Selection of the subjects was done based on the inclusion and exclusion criteria. The aim, need of study and procedure was explained to the subjects following which the subjects were divided into 2 groups, group A and group B of 15 each.

Pre-assessment of:

**Pain using NRS**

Ankle dorsiflexion ROM using goniometer  
Trigger point by palpating it within the taut band of the muscle was done and the findings were noted.

**Group A : Active Release Technique**

➤ For gastrocnemius:

Subject was in prone lying position with the knee flexed to 90 deg and the ankle maintained in plantarflexion. Therapist applied deep manual pressure on the trigger point and while sustaining it the subject actively extended the knee as well as dorsiflexed the ankle.15 repetitions were performed.(Fig 1)

➤ For soleus:

Subject was in prone lying position with the knee extended and the ankle plantarflexed outside the plinth. Therapist applied deep manual pressure on the trigger point and while sustaining it the subject actively dorsiflexed the ankle.15 repetitions were performed.

**Group B : Positional Release Therapy**

➤ For gastrocnemius:

Subject was in prone lying position with the knee flexed to 90 deg and the ankle plantarflexed. Therapist applied a deep manual pressure over the palpated trigger point and maintained it for 90 seconds. This procedure was repeated 3 times. (Fig 2)

➤ For soleus:

Subject was in prone lying position with the knee extended and the ankle plantarflexed. Therapist applied a deep manual pressure over the palpated trigger point and maintained it for 90 seconds. This procedure was repeated 3 times.

Both the groups were given conventional Physiotherapy treatment which included: Ice pack, eccentric exercises for plantarflexors and stretching of both gastrocnemius and soleus muscles.

Immediate post assessment for both the groups was done by measuring the ankle dorsiflexion range of motion using half circle goniometer and pain intensity using NRS.

NRS scores and ROM values were noted.

The data was collected and statistically analysed.



Figure 1 : Active release technique for gastrocnemius muscle



Figure 2 : Positional release therapy for gastrocnemius muscle

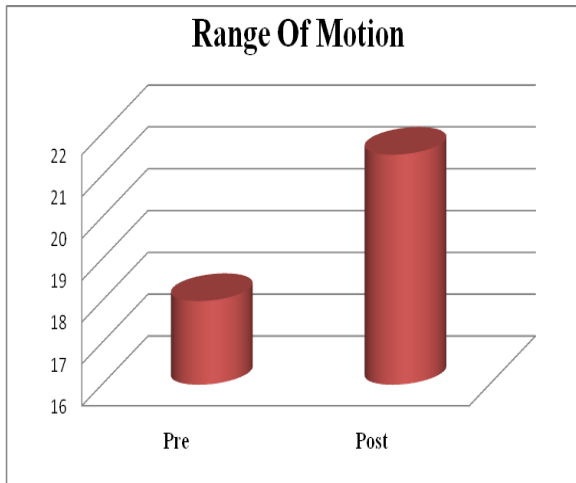
**STATISTICAL ANALYSIS:**

Collected data was entered in Microsoft Excel and Graph Pad Prism 8.3.1 was used for the data analysis. Normality of the data for range of motion and pain scores for both the groups was tested using the Kolmogorov-Smirnov test (KS test). Since the data was not normally distributed for both range of motion and pain scores for both the groups, statistical analysis was done using the non-parametric tests, i.e. within group comparison was done using

the Wilcoxon test and inter-group comparison was done using the Mann Whitney test for both the groups.

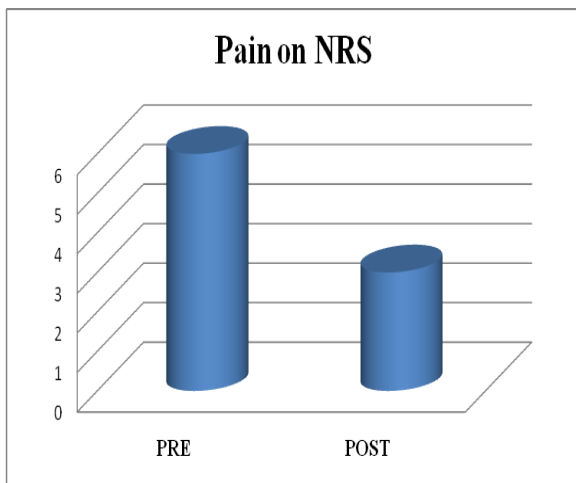
**RESULTS**

The result of Mann Whitney test for inter-group comparison shows that Positional Release Therapy is statistically more significant in improving the pain and range of motion scores when compared to Active Release Technique. (p<0.0001)



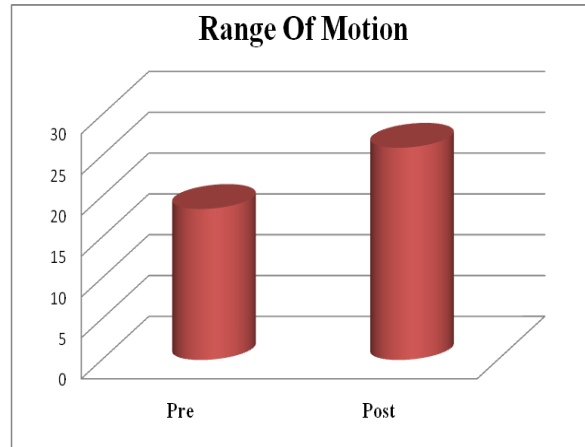
**Graph 1 :** Comparison of pre and post ankle dorsiflexion range of motion following Active Release Technique(ART)

The above graph shows that there was a significant increase in the ankle dorsiflexion range of motion following ART(p<0.0001)



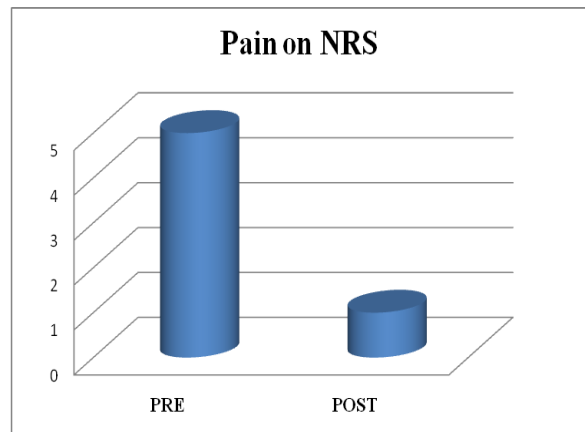
**Graph 2 :** Comparison of pre and post pain scores on NRS following Active Release Technique(ART)

The above graph shows that there was a significant reduction in the pain scores following the application of ART(p<0.0001)

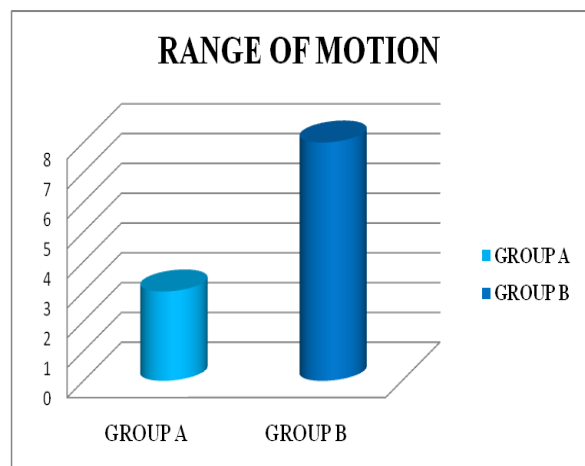


**Graph 3 :** Comparison of pre and post ankle dorsiflexion range of motion following Positional Release Therapy(PRT)

The above graph shows that there was a highly significant increase in the ankle dorsiflexion range of motion following PRT (p<0.0001)



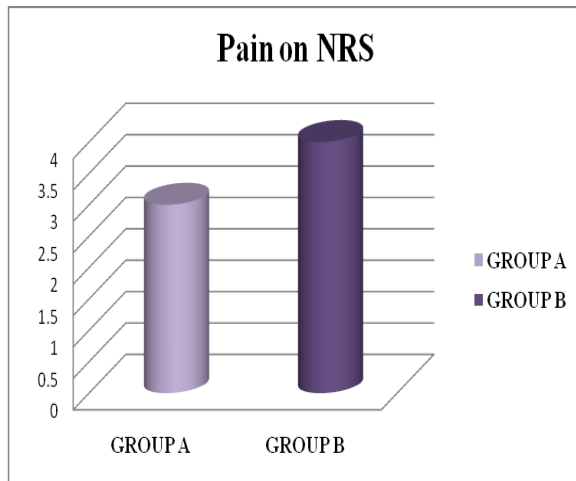
**Graph 4 :** Comparison of pre and post pain scores on NRS following Positional Release Therapy(PRT)



**Graph 5 :** Comparison of Range of Motion following Active Release Technique and Positional Release Therapy. GROUP A – Active Release Technique GROUP B – Positional Release Therapy

The graph 4 shows that there was a highly significant reduction in the pain scores following the application of PRT( $p < 0.0001$ )

The graph 5 shows that when both the groups were compared, Group B showed a greater increase in the ankle dorsiflexion range of motion when compared to Group A with a p value  $< 0.0001$



**Graph 6 : Comparison of Pain scores following Active Release Technique and Positional Release Therapy**  
GROUP A – Active Release Technique GROUP B – Positional Release Therapy

The above graph shows that there was a significant reduction in pain scores in Group B when compared to Group A( $p < 0.0001$ ).

## DISCUSSION

30 subjects having at least one hypersensitive tender nodule (trigger point) within the palpable taut band of the gastrocnemius or soleus muscle of age group 20 to 30 years were selected. They were randomly allocated into 2 groups of 15 each. Comparison of active release technique and positional release therapy for the release of gastrosoleus trigger points by assessing the ankle dorsiflexion range of motion and pain score on NRS was done. The data was collected and analysed using the non-parametric tests (Wilcoxon and Mann-Whitney).

Graph 1 shows that there is a significant increase in the pre(Median=18) and post(Median=21.5) dorsiflexion range of motion after the application of active

release technique in Group A(ART)( $p < 0.0001$ ). This finding is consistent with the study from Rob Grieve, et al who demonstrated that a single session of TrP pressure release to the soleus muscle has an immediate effect on the restricted active ankle dorsiflexion ROM. [10]

Graph 2 shows that there is a significant reduction in pre(Median=6) and post(Median=3) pain scores on NRS after the application of active release technique in Group A(ART)( $p < 0.0001$ ). This finding is supported by the study of Parth Trivedi et al. where active release technique significantly decreased the pain scores in patients with lateral epicondylitis. [11]

Graph 3 shows that there is a significant increase in the pre(Median=18.5) and post(Median=26) dorsiflexion range of motion after the application of positional release therapy in Group B(PRT) ( $p < 0.0001$ ). The study done by Brinda Shah, Dr. Keerthi Rao PT, et al. which showed that there is a significant increase in ankle dorsiflexion range of motion post PRT in persons with gastrosoleus muscle cramps supports the current finding. [12]

Graph 4 shows that there is a significant reduction in pre(Median=5) and post(Median=1) pain scores on NRS after the application of positional release therapy in Group B(PRT)( $p < 0.0001$ ). This result is consistent with the finding in the study carried out by Mohamed EL Sayed Abdelkarem Ali, et al. where a single session of PRT showed a significant reduction in pain score on VAS in patients with chronic low back dysfunction. [13]

According to the interpretation of the data in graphs 5 and 6, both the groups when compared, Group B i.e. Positional Release Therapy shows a greater increase in the ankle dorsiflexion range of motion post trigger point release. Positional release therapy is a technique proposed to increase muscle flexibility by placing the muscle in a shortened position to promote muscle relaxation in contrast to placing the muscle in a lengthened or stretched position. The neurophysiological rationale underlying the

therapy is based on the fact that alterations in afferent neurons affect somatic joint dysfunction. Restricted movement may be due to hyperactivity of the myotatic reflex arc, which is caused by excessive gamma gain. By positioning the patient's muscle in the position of ease for a short period of time, the gamma gain decreases, thereby allowing the hyperactive reflex arc to return to its original state and range of motion to increase. [8] These findings were in agreement with Marc H. who performed a study about ilio-sacral diagnosis and treatment as effect of positional release and rehabilitation exercise on gluteus medius, piriformis and pubic symphysis on low back pain patients and found that there is significant improvement in pain and ROM.

Also, when the pain scores on NRS were compared, a significant difference was observed in both the groups with Group B(i.e. Positional Release Therapy) showing a greater reduction in pain when compared to Group A( $p < 0.0001$ ). According to the proprioceptive theory, the neuromuscular imbalance, which is created by continuous stimulation of the muscle spindles, can be reduced by passively shortening the dysfunctional agonist muscle. Positional Release Therapy also allows the normal muscle spindle activity to return. Once agonist muscle spindle activity is reset, antagonist muscle spindle activity can also return to the resting state relieving aberrant neuromuscular activity & restoring normal function. [9] A study conducted by Soumik Basu et al. on effect of positional release technique versus deep transverse friction massage on gluteus medius trigger point in mechanical low back pain suggests that PRT reduces tissue tension which further aids in the normalization of local vascularisation and decreases pain caused by ischemia leading to restoration of pain free movement and increased muscle flexibility. [14]

On basis of statistical reference, the present study supports the previous studies on trigger point release stating that both Active Release Technique and Positional Release Therapy show a significant increase

in ankle dorsiflexion range of motion as well as a reduction in pain after the release of gastrosoleus trigger points.

However, the current study aimed at the comparison of the immediate effects on pain and ankle dorsiflexion ROM following Active Release Technique and Positional Release Therapy. The inter-group analysis concluded that Positional Release Therapy is much more effective for improving range of motion and pain scores when compared to Active Release Technique and hence it can be applied in clinical practice.

The main limitation of the study was that it was performed on a small sample size and only the immediate effect on range of motion and pain was taken into consideration rather than the long term effect.

Future studies can take into consideration the long term effect of PRT on the trigger points and also consider various age groups involved in recreational running activities.

## CONCLUSION

The present study concluded that Positional Release Therapy is a better intervention for the release of trigger points as it shows a greater increase in ankle dorsiflexion range of motion and a significant reduction in pain.

### Clinical Implication:

Trigger points in the calf muscles can be released using the Positional Release Therapy so that the runners can run painfree and more efficiently.

Positional release therapy can be applied on other myofascial trigger points as well which lead to pain and restricted movement.

### **Abbreviations**

MTrP: Myofascial Trigger Point  
ART: Active Release Technique  
PRT: Positional Release Therapy  
ROM: Range Of Motion  
NRS: Numerical Rating Scale

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