



Therapeutic efficacy of myofascial trigger point release therapy combined with self- stretching versus self- stretching alone for the management of unilateral heel pain- comparative study

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Abstract

Heel pain is a common foot problem. Pain usually occurs under the heel or just behind it, where the Achilles tendon connects to the heel bone. Sometimes it can affect the side of the heel.

Aim of the study: To evaluate the effectiveness of myofascial trigger point release therapy combined with self-stretching protocol versus self-stretching protocol alone for treating patients with unilateral heel pain.

Methodology: A pre - test and post- test experimental study design. Group A (study group) - Patients treated with myofascial trigger point release therapy combined with self – stretching protocol.

Group B (control group) - Patients treated with self- stretching protocol alone.

A sample of 30 patients were randomly selected according to pre- determined inclusion criteria and divided into Group A (Study group -15 patients) and Group B (Control group – 15 patients).

Both groups were evaluated using Visual Analogue Scale and Foot Function Index for every consecutive session. First day pre- test measurement was taken and the outcome was assessed at the end of the week, parameters was assessed

Results: The mean value of VAS group A (1.13) $p < 0.5$ and Group B (2.19). The mean value of FFI group A (38.3) and Group B (32.3) $p < 0.5$.

The present study concluded that the significant reduction in pain and improvement in foot function index in the group underwent treatment of trigger point release therapy and self-stretching in patients with unilateral heel pain when compared to the self-stretching protocol group.

Keywords: therapeutic, myofascial, therapy, stretching, unilateral

Introduction

A myofascial trigger point (MTP) has been described as an area of hyperirritability located in a taut band of muscle, variously described as resembling a small pea or rope-like slender nodular crepitant (crackling, grating) area within the muscle that is painful upon palpation and refers pain, tenderness and an automatic (functionally independent) response to remote area [1, 2, 3]. They also exhibit a local twitch response (muscle fasciculation) or “jump sign” (whole body movement) in response to digital pressure or dry needling.

Dr. Travels' research demonstrated that each muscle has referred pain. This means, a myofascial trigger point is capable of producing triggering pain in a specific pattern; both the areas where it is located and in another part of the body [8, 9, 10].

Studies have shown that as many as 93% of all pain patients seeking medical intervention for pain presented with myofascial trigger points.

Causes of Trigger Points

Trigger points have several causes. Some common causes of trigger points are: birth trauma, an injury sustained in a fall or accident, poor posture, or overexertion [11, 12, 13, 14, 15].

Most heel pain is produced by trigger points in the calf muscle. Though the calf muscles are very strong, they are easily overloaded by everyday activities. The trigger points that develop in these muscles refer pain to the foot for one

reason to get you off your feet and allow the overloaded calf muscles to recover [16, 17, 18, 19, 20].

The Muscles and Trigger Points that Cause Heel Pain

The trigger points are found in the following muscles that cause heel pain

1. Tibialis posterior.
2. Gastrocnemius.
3. Soleus.
4. Plantaris.
5. The most commonly involved muscles are:
6. The Gastrocnemius
7. The Soleus

The Gastrocnemius muscle group is the large muscle that makes up the bulk of the calf. It attaches to the large leg bone (the femur), just above the bend in the knee, and runs downward to attach to the Achilles tendon. It contracts to lift the body onto the toes during walking, running, and jumping. Four trigger points can develop in these muscles that refer pain to the arch of the foot, the calf, and the back of the knee regions. The trigger points may also cause calf cramping during the night [21, 22, 23, 24].

The Soleus muscle is a large, flat muscle that lies underneath the Gastrocnemius muscle in the calf region. It attaches to the lower leg bones (the tibia and fibula bones) just below the knee, and runs downward to attach to the Achilles tendon. Like the Gastrocnemius muscle, the Soleus muscle also contracts during walking and running.

Clinical Features of Myofascial Trigger Points

1. Muscle tightness and weakness
2. Taut band
3. Hard nodule formation in the muscle
4. Referred pain
5. Hyper irritability in the muscle region
6. Muscle cramps
7. Spot tenderness
8. Twitch response

Self-Stretching

The standard treatment for heel pain includes actively self-stretching the Gastrocnemius and Soleus (calf) muscles.

In this study, physical therapists from Brazil compare the use of stretching alone with a program of manual therapy combined with stretching. In this instance, manual therapy refers to the release of trigger points in the calf. This technique is done by the patient directly over the calf muscles and applying pressure using towels and wall push. Self-stretching alone doesn't always stop the pain or alleviate the problem. In theory, until the trigger point has been released, the heel pain will continue (or come back as soon as the stretching stops).

Trigger point therapy as described here decreases pressure pain sensitivity. Perhaps it turns off a reflex that is triggering muscle tightness so that the self-stretching becomes more effective

Trigger Point Release Therapy

Trigger point release therapy is also called myofascial trigger point release therapy. It was introduced by Dr. Janet Travel in the United States in the 1940s.

The treatment of trigger points has been around for quite some time. There have been several notable physicians who have contributed to this work. Among them are HANS KRAUS MD and JANET TRAVELL MD, both of whom worked with the complex muscular condition of John F. Kennedy. This therapy employs the use of manual therapy techniques to deactivate trigger points and restore normal range of motion. Once normal range of motion has been achieved a person may return to a pain free lifestyle. Modification of habit, which is generally simple and practical, is usually required to keep the pain from returning as well as some sort of exercise to recondition muscles that once harbored trigger points.

Trigger Point Therapy is used when Myofascial Trigger Points are present in a person's muscles. Myofascial Trigger Points, usually just called Trigger Points, are hyperirritable spots in a muscle associated with a palpable "knot" or "taut band" in the muscle tissue. Trigger Points are painful on compression and can refer pain and tenderness to other areas. Trigger Points are usually ischemic and often cause an entire muscle to be painful, too tight, weak, and more easily fatigued. Trigger Points can be caused by overworking or overstressing muscles, direct trauma to muscles, or even sustained chills. Trigger Points can be either the cause or a contributing factor of a wide variety of painful conditions [25].

Trigger Point Therapy directly targets the trigger points and the muscles in which they're found. In Trigger Point Therapy the Massage Therapist carefully seeks out the trigger points in a muscle with their fingers and uses specific compression techniques, friction strokes, and stretches which make the trigger points release and

seemingly melt away. The release of the trigger point usually results in a rapid decrease or complete elimination of muscular pain [26].

Trigger Point Therapy does have a reputation as being a painful therapy to receive. However, despite its reputation as a "no pain, no gain" type of technique Trigger Point Therapy can be quite comfortable to receive. Some clients may experience some mild discomfort during the treatment. This mild discomfort is often described as a "good pain" that rates low on a standard pain scale and is actually welcomed by most clients.

The Purpose of Trigger Point Release Therapy

The purpose of trigger point release therapy is to eliminate pain, range of motion is increased, tension is relieved, and circulation, flexibility and coordination are improved.

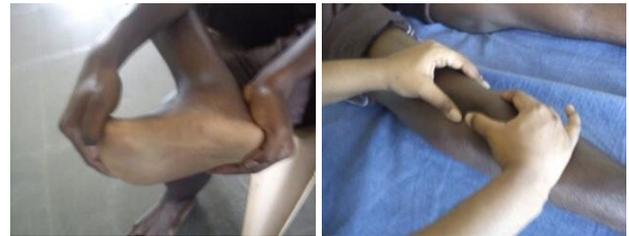


Fig 1: Performed in calf muscle

Aim of the Study

To find out the efficacy of myofascial trigger point release therapy combined with self-stretching protocol versus self-stretching protocol alone for treating patients with unilateral heel pain.

Statement of the Problem

To compare the effectiveness of myofascial trigger point release therapy combined with self-stretching protocol versus self-stretching alone for treating patients with unilateral heel pain.

Objective of the Study

This study aim is to quantify the reduction in heel pain brought about by myofascial trigger point release therapy combined with self-stretching protocol versus self-stretching protocol alone.

Methodology

Materials (Tools)

1. Couch
2. Pillows
3. Ice pack
4. Towel
5. Evaluation Chart

Study Design

A pre - test and post- test experimental study design.

1. Group A (study group) - Patients treated with myofascial trigger point release therapy combined with self - stretching protocol.
2. Group B (control group) - Patients treated with self-stretching protocol alone.

Study Sampling

1. The sample included in this study is simple random sampling.

2. Each group assigned with 15 patients.

A sample of 30 patients were randomly selected according to pre- determined inclusion criteria and divided into Group A (Study group -15 patients) and Group B (Control group – 15 patients).

Study group received myofascial trigger point release therapy and self – stretching protocol.

Control group received only self-stretching protocol.

Both groups were evaluated using Visual Analogue Scale and Foot Function Index for every consecutive session. First day pre- test measurement was taken and the outcome was assessed at the end of the week, parameters was assessed

Duration of the Study

Total duration of this study is 6 months.

Duration of the Treatment

Each patient received the treatment for 45 min, single session for alternative days in a week (3 sessions).

Inclusion Criteria

1. Mean age of 40 – 60 years.
2. Unilateral involvement.
3. Pain felt maximally over plantar aspect of heel.
4. Pain perceived while prolonged standing and walking.
5. Weakness of calf muscles.

Exclusion Criteria

1. Referred pain due to sciatica and other neurological disorders.
2. Calcaneal spur.
3. Plantar fasciitis.
4. Bilateral involvement.
5. IVDP.
6. Arthritis.
7. DVT.
8. Recent fractures in ankle.
9. Any metal implants.
10. Any Tendo Achilles pathology.

Parameters of the Study

1. Visual Analogue Scale (VAS) in cms.
2. Foot Function Index.

<p>Independent Sample T-test Formula</p> $t = \frac{\bar{X}_1 - \bar{X}_2}{S_{\bar{X}_1 - \bar{X}_2}}$ $S_{\bar{X}_1 - \bar{X}_2} = \sqrt{\left(\frac{N_1 s_1^2 + N_2 s_2^2}{N_1 + N_2 - 2} \right) \left(\frac{N_1 + N_2}{N_1 N_2} \right)}$

X1 = Difference between pretest and posttest values of Group A
 X2 = Difference between pretest and posttest values of Group B

n1 = No. of samples in Group A
 n2 = No. of samples in Group B

S = Combined standard deviation

Treatment technique

Trigger point release therapy

Patient Position: Lying prone on the couch with his head

rested on the pillow with his/her hands by their side.

Both the legs rested on the pillow.

Therapist Position: Therapist standing near to affected side of the leg near to the couch.

Application of Technique

Identify the trigger point.

For Gastrocnemius

The trigger point is palpated in the upper one third of the muscle in the midpoint of the calf muscle.

For Soleus

The trigger point is palpated in the lower one third of the muscle above the Tendo Achilles.

Apply gentle, gradually increasing pressure to the trigger point, whilst lengthening the affected/host muscle until hitting a palpable barrier. This should be experienced by the patient as discomfort and NOT pain Apply sustained pressure until the trigger point is felt to be softened. Repeat, increasing the pressure on the trigger point until meeting the next barrier.

Duration: 15-minutes



Fig 2: Trigger point release in Soleus muscle



Fig 3: Trigger point release in Gastrocnemius

Ice-Pack: Ice-pack applied to the trigger point area for 10 mins

Uses

1. To reduce sore pain in affected area or any muscle micro tear.
2. To improve blood circulation and there by nutrition supply to the tissues.

Self-Stretching Technique: Wall Push-Up (Gastrocnemius)

1. Stand with the rear foot approximately two to three feet from the wall.
2. The rear leg should be straight, the front leg is bent and your hands touch the wall.
3. Feet point straight ahead, heels are on the ground.
4. Hold for 10 seconds, switch legs, repeat 10 times. Calf Stretch with Towel
5. Calf stretch in long sitting with the leg to be stretched in front of the patient.
 - a. The knee and back should be straight and a towel or rigid band placed around the foot that is to be stretched.
6. Using the foot, ankle and the towel, the toes should be brought towards the head until a stretch is felt in the back of the calf, Achilles tendon or leg.
7. Hold for 5 seconds and repeat 10 times at a mild to moderate stretch provided the exercise is pain free.

Self-stretching for Soleus

1. In standing position, the patient is asked to place the foot on the wall.
2. Then ask the patient to lean towards the wall.
3. Ask the patient to hold for 10 to 15 seconds and repeat 5 times.



Fig 4: Self-stretching of calf muscle using towel

Self-stretching for Soleus muscle

Home programme

Calf and foot strengthening exercise

1. Stand on a stair with one hand on the wall (or) railing for support.
2. Place the toes on the stair and let the heels to hang.
3. Slowly lift the toes, and then return back to the starting position.
4. Repeat for 10 times up and down for 3 sets, a total of 30 lifts.

Uses

1. Stabilizes and strengthens the calf and foot muscles.
2. Prevents heel pain.

Ball Roll

1. Sit down on a chair.
2. Place a tennis ball under the arch of foot.
3. Then roll the ball forward and backward with foot.

Uses

1. Stretches plantar fascia.
2. Relieves pain.

Alphabet Exercise

1. Spell out the alphabet with larger toe.
2. Repeat for 3 Times for each feet.

Uses

Helps to stretch plantar fascia and promote healing.

Heel off and toe off Exercise

In sitting position, with hip and knee in 90 degree, heel off and toe off is performed.

Hold for 5 sec and repeated for 10 times.



Fig 5: Toe off exercise in sitting position Heel off in sitting position



Fig 6: Ball roll



Fig 7: Heel stretch



Fig 8: Heel stretch exercise while lifting the toe

Table 1: Visual Analogue Scale- Group A

S.No.	Pre test	Post test	X1	(X 1 – X1)	2 (X 1 – X1)
1	7	4	3	0.1	0.01
2	7	4	3	0.1	0.01
3	8	4	4	1.1	1.21
4	7	4	3	0.1	0.01
5	6	4	2	-0.9	0.81
6	7	5	2	-0.9	0.81
7	8	4	4	1.1	1.21
8	7	5	2	-0.9	0.81
9	7	4	3	0.1	0.01
10	8	4	4	1.1	1.21
11	7	5	2	-0.9	0.81
12	7	4	3	0.1	0.01
13	8	4	4	1.1	1.21
14	7	5	2	-0.9	0.81
15	7	4	3	0.1	0.01

Table 2: Visual Analogue Scale - Group B

S.No.	Pre test	Post test	X2	(X 2 – X2)	2(X 2 – X2)
1	7	6	1	-0.13	0.0169
2	8	6	2	0.87	0.7569
3	7	6	1	-0.13	0.0169
4	7	6	1	-0.13	0.0169
5	7	5	2	0.87	0.7569
6	8	7	1	-0.13	0.0169
7	6	5	1	-0.13	0.0169
8	7	6	1	-0.13	0.0169
9	8	7	1	-0.13	0.0169
10	8	7	1	-0.13	0.0169
11	8	7	1	-0.13	0.0169
12	7	6	1	-0.13	0.0169
13	8	7	1	-0.13	0.0169
14	7	6	1	-0.13	0.0169
15	8	7	1	-0.13	0.0169

Table 3: Mean Difference between Group A and Group B Visual Analogue Scale

Parameter	Groups	Mean	Calculated 't' value	Table value
VAS	Group A	1.13	3.54	2.763
	Group B	2.9		

Table 4: Foot Function Index Group A

S. No	Pre test	Post test	X1	(X 1 – X1)	2 (X 1 – X1)
1	72.3	36.2	36.1	2.85	8.1225
2	76.2	37.2	39	3.25	10.5625
3	70.5	39.4	31.1	4.65	21.6225
4	70.5	36	34.5	3.25	10.5625
5	74.7	34	40.7	4.95	24.5025
6	70.5	25.2	45.3	5.75	33.0625
7	71.1	36.1	35	4.5	20.25
8	72.3	33	39.3	3.55	12.6025
9	70	31	39	2.75	7.5625
10	75.2	32.2	43	7.25	52.5625
11	71.1	31.1	40	4.25	18.0625
12	71.1	36.3	34.8	4.05	16.4025
13	70.5	35	35.5	4.05	16.4025
14	74.7	34.2	40.5	4.75	22.5625
15	71.1	31.1	40	4.25	18.0625

Table 5: Foot Function Index Group B

S. No.	Pre test	Post test	X2	(X 2 – X2)	2 (X 2 – X2)
1	71.1	41.7	29.4	2.6	6.76
2	70.5	39.4	31.1	-0.9	0.81
3	70.5	41.1	29.4	-2.6	6.76
4	71.1	39.4	31.7	-0.3	0.09
5	70	41.1	28.9	-3.1	9.61
6	72.3	40.5	31.8	-0.2	0.04
7	75.2	40	35.2	3.2	10.24
8	71.7	41.1	30.6	-1.4	1.96
9	74.7	44.1	30.6	-1.4	1.96
10	73.5	40.5	33	1	1
11	74.7	40.5	34.2	2.2	4.84
12	71.1	38.2	32.9	0.9	0.81
13	70.5	37	33.5	1.5	2.25
14	72.3	38.8	33.5	1.5	2.25
15	75.2	40.5	34.7	2.7	7.29

Table 6: Mean Difference between Group A and Group B Foot Function Index

Parameter	Groups	Mean	Calculated 't' value	Table value
FFI	Group A	38.2	4.61	2.763
	Group B	32.3		

Discussion

This was an experimental study conducted to evaluate and to compare the effectiveness of trigger point release therapy and self-stretching protocol versus self- stretching protocol alone in treating patients with plantar heel pain.

SIMONS described his criteria for identifying trigger points. These criteria include identifying of a taut band in a muscle is accessible; A tender spot on the taut band; Referred pain or altered sensation, at least 2cm beyond the spot; Elicited by digital pressure or needle penetration held for 10 seconds; And restricted Range of motion (ROM) in the joint the muscle crosses [4, 5, 6, 7].

For my study I have received thirty six patients. Out of thirty six, six patients were discarded due to irregular follow up. Thirty subjects were assigned for the treatment and were divided into two groups.

The statistical analysis was performed between these two groups namely trigger point release therapy along with self-stretching protocol and self-stretching protocol alone. Treatment duration was given alternative days in a week.

The parameters taken for this study was visual analogue scale and foot function index. The values were assessed for both the groups using these two parameters before and after

the treatment duration.

The results of this study suggest that the combination of trigger point release therapy and self-stretching protocol results in short term outcomes when compare to self-stretching protocol alone in the treatment of patients with plantar heel pain. Both the results were statistically analyzed by using independent t test.

Pain was found to reduce effectively in experimental group when compared to control group using VAS. In the independent t test the t value is 3.54. The t value is greater than the one tailed table value 2.763 with 28 degrees of freedom at p= 0.05 respectively. The decrease in pain and reduction in disability was effective in experimental group when compared to control group. In functional improvement the independent t test the t value is 4.61. This t value greater than the table value 2.763 with 28 degrees of freedom at p=0.05 respectively. Hence we can reject the null hypothesis and accept the alternative hypothesis. There for the treatment given in experimental group reduces pain effectively than control group.

Conclusion

Based on statistical analysis from the data collected have shown significant reduction in pain and improvement in foot function index in the group underwent treatment of trigger point release therapy and self-stretching in patients with unilateral heel pain when compared to the self-stretching protocol group.

Limitations

1. Though carried out the best of the efforts this study have the following limitations
2. Short time bound study.
3. Further there is also a lack of long term follow up.
4. The study has the small sample size.
5. Recurrence of the condition is not been assessed.

Recommendations

1. Based on the outcome of the statistical analysis it is suggested that the further studies should be modified to accommodate the following changes
2. Large sample size.
3. Long term follow up to analyze the effect of trigger point release therapy and self-stretching protocol and trigger point release alone.
4. Multiple groups can be included for the study.

5. Calf Muscle strengthening exercise can also be used along with self-stretching protocol.
6. Ultra sound Therapy can be included to treat trigger point along with my study.

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