

Effect of Primal Reflex Release Technique on Pain, Mobility and Function in Patients with Chronic Plantar Fasciitis - An Experimental Study

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ABSTRACT

Background: Plantar fasciitis (PF) is an inflammation of plantar fascia and perifascial structures. The aim of this study was to find out the effect of Primal Reflex Release Technique (PRRT) as an adjunct to conventional physiotherapy on pain, mobility and function in patients with chronic plantar fasciitis.

Methods: A total of 33 patients with chronic PF with age between 25-65 years were included. They were randomly divided into 2 groups: control group (n=17) and experimental group (n=16). Both groups received conventional physiotherapy, in addition experimental group also received PRRT. Subjects were assessed with Numerical Pain Rating Scale (NPRS), eversion and inversion Range of Motion (EROM & IROM) and Patient Specific Functional Scale (PSFS) at 0 week, 2 week and 4 week.

Results: Friedman test was applied for intra-group comparison and Mann Whitney U test was applied for between group comparison. Result showed that there was statistically significant difference between control group and experimental group in mean difference of NPRS and PSFS ($p < 0.05$). But there was no statically significant difference in mean difference of EROM and IROM during 4 week intervention period ($p > 0.05$).

Conclusion: PRRT along with conventional physiotherapy is more effective for reducing pain and improve the function in patient with chronic plantar fasciitis. There is no additional effect of PRRT on mobility.

Keywords: Primal Reflex Release Technique, Plantar fasciitis, Pain, Mobility, Function

INTRODUCTION

Plantar fasciitis is an inflammation of the plantar fascia and the perifascial structure, resulting from repeated trauma to plantar fascia at its origin on the medial tubercle of the calcaneus.⁽¹⁾ It is the most common cause of inferior heel pain.⁽²⁾ It is estimated that 1 in 10 people will develop plantar fasciitis during their lifetime.⁽³⁾

There are intrinsic as well as extrinsic risk factor responsible for developing plantar fasciitis. Intrinsic factors are age, gender, obesity, excessive foot pronation, tightness of achilles tendon etc.⁽⁴⁻⁶⁾ Extrinsic factors are occupational prolong standing and weight bearing, repetitive microtrauma, inappropriate shoe wear, overuse injury combine with running surface etc.⁽⁷⁾ These factors causes irritation of plantar fascia and

leads to inflammation either at the medial calcaneal tubercle or within the plantar fascia itself.⁽¹⁾

Most patients present with sharp heel pain which gets worsen in the morning or after a period of rest, with maximal discomfort reported during the initial few steps, and progressive improvement as the person continues to walk.⁽⁸⁾ Clinical examination reveals tender areas along the medial part of heel or medial arch in most patients.⁽⁹⁾

Conservative treatment includes various electrotherapy modalities along with physiotherapy treatment protocols such as rest, taping, orthotics, silicon heel cups, stretching, Myofascial Release etc.^(2, 10, 11)

Primal Reflex Release Technique (PRRT) is a new method of treatment in the field of pain management, developed by John Iams, a physical therapist based in California.⁽¹²⁾

PRRT is a treatment paradigm that falls under the regional interdependent approach to patient care. It involves down-regulating an overstimulated autonomic nervous system in order to reduce patterns of pain.⁽¹³⁾ The concept behind this approach is that dysfunction in one area or system of the body may result in perceived pain or deficiency in another region of the body. That one system of the body which may contribute to plantar fascia pain is the nervous system and its associated network of reflexes.^(14, 15) Overstimulation of the nervous system can result in pain and dysfunction.⁽¹³⁾ These treatment involves providing 12 seconds of light, swift sensation in the form of repetitive deep tendon reflexes (DTR) that tap or stimulate the skin to inhibit painful areas.⁽¹²⁾

The beneficial effect of PRRT is studied in treatment of chronic pain syndrome, shoulder pain and breathing pattern disorders.^(12, 16, 17) Hansberger BL et al, 2015 also studied a case series to know the effect of PRRT as a novel approach to treating plantar fasciitis and found positive changes in term of improvements in pain and dysfunction.⁽¹⁸⁾

Previous studies done about PRRT are case series. There is lack of quality evidence on

the effect of this technique on larger sample. Hence the purpose of this study to find out the effect of Primal Reflex Release Technique as an adjunct to conventional physiotherapy on pain, mobility and function in patients with chronic plantar fasciitis.

MATERIALS & METHODS

It was pre-post experimental study which was carried out in patient with chronic plantar fasciitis in Surat city over the duration of 1 year. Purposive sampling was used. Ethical clearance was taken from institutional ethical committee. The purpose of the study was explained and all the participants were asked to give written informed consent. They were randomly allocated into two groups by sealed envelope method. In Group-A patients were undergone primal reflex release technique and conventional physiotherapy and in Group-B patients were undergone conventional physiotherapy.

Subjects included in the study were male and female between 25-65 years, diagnosed and referred case of plantar fasciitis by orthopaedic surgeon with duration of more than 3 months and having one or more trigger points with elicitation of Nociceptive Startle Reflexes (NSRs) over plantar aspect of foot. Subjects were excluded with history of lower limb fracture, surgery for plantar fasciitis, subjects who had taken corticosteroid injection in heel past 3 months, presence of other musculoskeletal complains in the lower limb, Ankle ankylosis, congenital foot deformity, any neurological disorder / neurological pain, diabetic foot and clinical disorder where therapeutic ultrasound is contraindicated.

Outcome Measures

1) Numerical Pain Rating Scale⁽¹⁹⁾

The NPRS is a valid and reliable self-reported, or clinician administered, measurement tool consisting of a numerical point scale with extreme anchors of 'no pain' to 'extreme pain'. The patient was

asked to rate his/her current pain intensity on the scale is typically set up on a horizontal line, ranges from 0–10.

2) Mobility⁽²⁰⁾

Inversion and Eversion ROM were measured with the help of Goniometer.

3) Patient Specific Functional Scale⁽²¹⁾

PSFS is a self-reported, patient-specific outcome measure, designed to assess functional change, primarily in patients presenting with musculoskeletal disorders. Patients were asked to identify up to five important activities they were unable to perform or had difficulty with as a result of their problem. Patients were also asked to rate it on an 11-point scale. "0" represents "unable to perform" and "10" represents "able to perform at prior level".

PROCEDURE

Intervention was given 5 days/week for 2 weeks. All the outcomes were measured pre-intervention at 0 week, post intervention at 2 weeks. Follow up measurements were taken after 4 weeks.

Primal Reflex Release Technique

The first four steps of the PRRT treatment required the subject to maintain a specific position while a 12-second application of Deep Tendon Reflexes (DTR) stimulation will be performed in each of the four areas:

- The first location, stimulation was applied above and below the medial knee.
- The second location was at the peroneal tendons with the patient holding the foot in Eversion.
- The third and fourth sites were involved releasing tension in the gastrocnemius and hamstring muscles, respectively. For the gastrocnemius, the stimulation was applied simultaneously over the patellar tendon and anterior tibialis tendon. For the hamstring release, stimulation was applied to the patella tendon and hamstring muscle belly.
- The final step of the treatment was required the subject to grip two cotton - tipped applicators with the toes while performing sustained maximal plantar-flexion of the ankle.

Conventional physiotherapy

It included Therapeutic Ultrasound (US) with continuous mode, intensity of 1W/cm² & with frequency of 1MHz for five minutes in prone lying position. Also included towel curl up, active ankle exercise, stretching of plantar fascia and stretching of achilles tendon exercises.

STATISTICAL ANALYSIS

Statistical analysis was done using SPSS version 15.00 software. All the quantitative data were not following the normality ($p \geq 0.05$) checked by the Shapiro-Wilk test. Hence non-parametric test was used. Mann-Whitney U test was used for all the demographics and outcome measures like AGE, BMI, DURATION OF SYMPTOMES, NPRS, ROM and PSFS before the training (Table 1). Friedman test was used to analyse differences within each group. Mann-Whitney U test was used for between group comparison. Confidence interval was kept 95% and the level of significance was set at 0.05.

RESULT

Total 46 patients were assessed for eligibility. 33 patients were enrolled in the study and randomized to one of the treatment group - 16 in experimental group (group A) and 17 in control group (group B) (figure 1). There were 15 females and 1 male and 16 females and 1 male in Group A and Group B respectively. The baseline characteristics were similar between groups. All the parameters showed no significant difference ($p > 0.05$) before intervention (Table 1).

Intragroup comparison of pre and post intervention NPRS, EROM, IROM and PSFS showed significant difference in both the groups ($p < 0.05$) (table 2).

Intergroup comparison showed significant differences between the groups for NPRS and PSFS outcome measures ($p < 0.05$) (table 3). But there were no significant differences observed between the groups for EROM and IROM outcome measures.

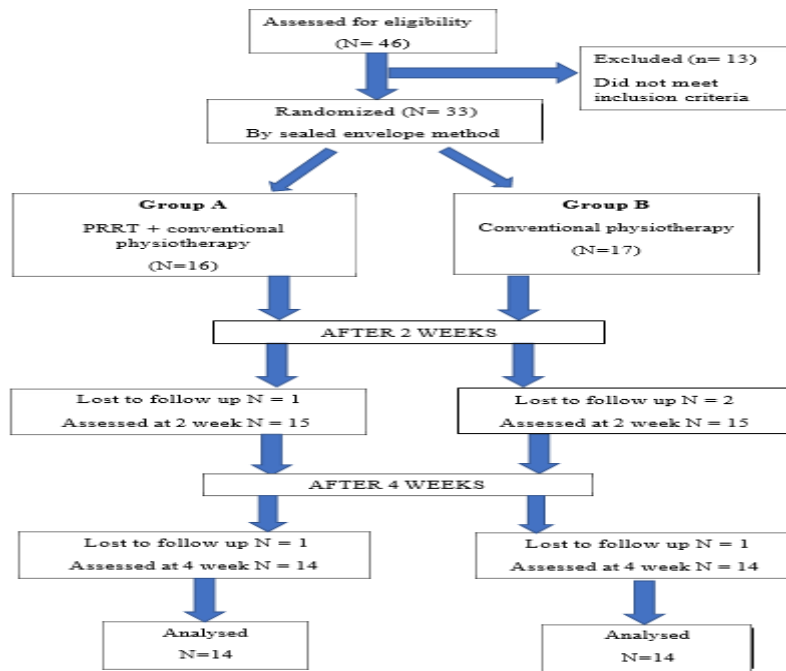


Figure 1: Flow diagram of participants' recruitment and retention through the study

TABLE: 1 – Baseline characteristics of subjects of group A and group B using Mann-Whitney U test

VARIABLE	GROUP A	GROUP B	P value
	Mean ± SD	Mean ± SD	
AGE (Years)	45.12±9.69	41.12±11.58	0.245
BMI (kg/m ²)	27.77±4.11	26.99±3.74	0.763
DURATION OF SYMPTOMS (Months)	7.68±9.17	5.06±2.78	0.986
PRE EROM	9.38±4.43	11.11±3.77	0.168
PRE IROM	39.50±6.05	37±4.14	0.510
PRE PSFS	3.14±1.04	2.87±1.08	0.444

TABLE: 2 – Intra-Group comparison of pre-intervention (0 week), post intervention (2 week) and follow up (4 week) mean of NPRS, EROM-IROM and PSFS score using Friedman test

VARIABLE	GROUP A			P VALUE	GROUP B			P VALUE
	Pre-intervention (week-0) Mean±SD	Post-intervention (week-2) Mean±SD	Follow up (week-4) Mean±SD		Pre-intervention (week-0) Mean±SD	Post-intervention (week-2) Mean±SD	Follow up (week-4) Mean±SD	
NPRS	7.28±0.82	1.00±0.78	0.57±0.75	0.000	7.71±1.32	4.71±1.32	4.43±1.65	0.000
EROM	8.93±4.46	13.50±3.69	13.71±3.69	0.000	10.78±3.24	13.36±3.65	13.71±2.97	0.000
IROM	39.78±6.37	43.43±5.69	44.07±5.52	0.001	36.43±3.82	39.43±3.39	40.64±2.68	0.000
PSFS	3.19±1.11	9.29±0.63	9.53±0.62	0.000	3.06±1.05	5.95±1.17	6.11±1.35	0.000

TABLE: 3 – Inter group comparison of mean difference values of NPRS, EROM-IROM and PSFS between two group using Mann Whitney U tests.

VARIABLE	GROUP A	GROUP B	P-VALUE
	Post-Pre Diff (Mean±SD)	Post-Pre Diff (Mean±SD)	
NPRS	-6.71±1.07	-3.28±1.20	0.000
EROM	4.78±3.86	2.93±2.61	0.178
IROM	4.28±2.49	4.21±2.69	0.804
PSFS	6.30±1.29	3.05±1.09	0.000

DISCUSSION

The current study was conducted to find the effect of primal reflex release technique on pain, mobility and function in patients with chronic plantar fasciitis. In 4 week intervention period both the group showed statistically significant improvement in NPRS, EROM, IROM and PSFS post intervention compared to pre intervention measures. Mean post-pre differences in NPRS and PSFS were more in experimental group compared to control group. But there was no statistically significant difference in mean post-pre difference in mobility score as measured by EROM and IROM, when compared both experimental and control group.

Conventional physiotherapy which included US, intrinsic muscle strengthening in form of towel curl up, active ankle exercise, stretching of Achilles tendon and stretching of plantar fascia. The possible mechanism for statistically significant improvement in pain by ultrasound can be explained through non-thermal effects of US in tissues.⁽²²⁾ It helps by stimulating histamine release from mast cells and factors from macrophages that accelerates normal resolution of inflammation. The stretching will help to relieve the stress on the tightened fascia and muscle and will reduce the pain.⁽²³⁾ Strengthening exercise for intrinsic muscles of the foot will help to treat the weak intrinsic muscle and help in supporting the arches of the foot.⁽²⁴⁾ So stretching and strengthening reduced stress and pressure on tightened fascia and tendon and restore the normal range of motion.⁽²³⁾ The improvement in function was the result of reduction of pain in the both groups post intervention compared to pre intervention.

In the experimental group additional reduction of pain intensity is may be the effect of PRRT. PRRT based on the premise that over-stimulation of the body's primal reflexes creates pain and keeps painful pattern occurring again and again.⁽²⁵⁾ The basic theory behind PRRT is that pain in the periphery is influenced and controlled by the Central Nervous System (CNS). The CNS can be divided into 2 parts, the Somatic and the Autonomic Nervous System (ANS). According to Iams, the startle and the withdrawal reflex are the main primal reflexes, which are called upon to protect the body when encountering a painful, startling or stressful experience following injury or even perceived tissue damage. These primal reflexes influence motor behaviour and can be sustained in a state of "hyper-readiness" / "up-regulation" leading to patterns of pain.⁽¹²⁾ PRRT address the neural system by resetting hyper-aroused primal reflexes within the body and "down-regulate" the overstimulated ANS in order to reduce pattern of pain. A potential explanatory theory is that these repetitive reflex stimulations send many impulses to the spinal cord, which may cause the spinal cord and brain to temporarily "overload" and "reset".⁽¹⁸⁾ PRRT addresses muscle and joint receptors along with their spinal modulation. This technique facilitates rapid "Neural Reboot." This neural reboot resets the neural control of joints, muscles, and fascia to release joint restrictions, trigger points, and fascial restrictions.

The result of the present study was also supported by the few previous studies done on PRRT in patients with plantar fasciitis and other musculoskeletal conditions. Bethany L. Hansberger et al., (2015) conducted a case series on effect of Primal

Reflex Release Technique to treating a plantar fasciitis. He applied PRRT technique in eight consecutive cases of PF in physically active subjects and he found positive changes in terms of improvements in reported pain and dysfunction and a shorter time to resolution, when compared to traditional treatment methods for PF reported in the literature.⁽¹⁸⁾ Nicola McKeon et al., (2009) done a case study on use of Primal Reflex Techniques in the treatment of chronic pain and the patient had a 9-month history of chronic pain in multiple joints. PRRT were used to globally treat the patient in an effort to balance her autonomic nervous system and reduce muscle tone, guarding and thus pain. The patient reached a pain-free status after five treatments and a return to a fully functional pain free lifestyle after 9 sessions.⁽¹²⁾

There are some limitations of the study, as there was Unequal ratio of male and female in study population, no long term follow up and for the mobility outcome, only EROM and IROM have been measured. In future studies, it can be done on equal male-female ratio in patients with bilateral plantar fasciitis and long-term effect can be studied. A comparative study can be done between PRRT with other manual therapy approaches commonly used in physiotherapy.

CONCLUSION

Both the intervention techniques used in the present study i.e., conventional physiotherapy and PRRT along with conventional physiotherapy are effective for improving pain, mobility and function in patient with chronic plantar fasciitis. However, PRRT along with conventional physiotherapy is more effective for reducing pain and improves the function in patient with chronic plantar fasciitis. There is no additional effect of PRRT on the mobility in patient with chronic plantar fasciitis.

Declaration by Authors

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