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### Added effect of cyriax deep friction massage on functional ability in patients with chronic plantar fasciitis

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#### ABSTRACT

##### Objectives

To assess the added effect of Cyriax deep friction massage along with conventional treatment on functional ability in patients with chronic plantar fasciitis.

##### Methods

In this experimental study, 26 subjects with chronic plantar fasciitis were randomly allocated into two groups; control and experimental group. The control group received conventional therapy consists of ultrasound, tendoachilis stretching, plantar fascia stretching and intrinsic muscle strengthening. Experimental group received Cyriax deep friction massage along with conventional therapy. Treatment was given thrice a week for 2 weeks alternatively. Foot Function Index (FFI) Scale was used to assess the functional ability. Data analysis was done pre and post treatment.

##### Result

On pre post analysis, FFI score showed significant improvement in both control (P=0.0002) as well as experimental (P=0.0002) group. However between group analysis FFI showed significant improvement in experimental group (P<0.0001, U=8.000)

##### Conclusion

Cyriax deep friction massage along with conventional therapy was more effective in improving functional ability in patients with chronic plantar fasciitis.

**Keywords:** Plantar fascia, Plantar fasciitis, Cyriax deep friction massage

#### INTRODUCTION

Plantar fasciitis is the most widely recognized reason for plantar heel torment in middle age

populace [2]. Plantar fasciitis influences both inactive and athletic individuals and is thought to come about because of perpetual over-burden either

from way of life or exercise. It is evaluated that 1 in 10 individuals will create PF amid their lifetime [1].

Plantar fascia is the thick, stringy connective tissue structure beginning from the medial tuberosity of calcaneus. It has three parts medial, lateral and central. Central portion is the biggest one which begins from medial portion of calcaneal tuberosity. The band stretches out through the medial longitudinal curve into individual bundle and embed into each proximal phalanx [4].

Plantar fascia is an essential static support for the longitudinal curve of the foot. Strain on the longitudinal curve applies its maximal draw on the plantar fascia particularly at its origin on the medial procedure on calcaneal tuberosity. The plantar fascia elongates with increase in loads to act as shock absorber, but its ability to elongate is limited. [4]

The condition is because of the smaller scale tears in the collagen strands of plantar fascia because of support extend. Amid the initial 15% of gait cycle, the foot is subjected to a weight as much as 120% of the body weight. This heap on the foot is upheld by detached structures (bones and tendons) alone as an inherent muscles come without hesitation just around 30% of step cycle. Hence, the greatest worry of body weight falls on the tendons and plantar fascia. Critical anxiety falls on the plantar fascia in balancing out the foot from heel raise to toe off period of stride cycle. Repeated stress of this nature causes plantar fasciitis [5].

Numerous nonsurgical treatment modalities have been utilized as a part of dealing with the condition, including rest, knead, non-steroidal anti inflammatory drugs, night splints, heel mugs/cushion, custom and off the rack orthoses, infusions, casts and and physical therapy which includes plantar fascia stretching, TA stretching, ultrasound measures, shock wave therapy. [2,4] Nonsurgical administration of plantar fasciitis is fruitful in approx 90% of patients. Surgical treatment is considered in just a little subset of patients with tireless, serious manifestations obstinate to non surgical mediation for at least 6 to 12 months [2].

The reason for Cyriax deep friction massage is to keep up the mobility inside the delicate tissue structures of tendon ligament and muscles and to anticipate discoloration scar formation [6].

Cyriax deep friction massage is indicated in cases of tendinitis, ligamentous sprains, muscular lesions, ect. [6]

Michael F. Joseph, et al reasoned that there is some confirmation of advantage of deep friction massage at the elbow in blend with Mill's control and in addition for supraspinatus tendinopathy within the sight of outlet impingement and alongside joint mobilization [7]. DFM have been utilized as a part of treatment of infrapatellar tendinitis [8].

Geoff Formosa et al did the review to evaluate the impact of transverse friction massage on the plantar fasciitis, the presumed that home exercise program, and in addition transverse friction massage were similarly satisfactory and no antagonistic impacts were reported in 6 weeks of treatment sessions [9]

But the effect of cyriax deep friction massage in 2 weeks protocol along with conventional therapy used in practice has not been determined. It is therefore useful to explore the effectiveness of short period treatment that may assist people with plantar fasciitis, particularly those treatments such as cyriax deep friction massage which are non invasive and are likely to be safe and inexpensive.

## **MATERIALS AND METHODS**

After receiving ethics clearance from the institutional committee of the Physiotherapy College, subjects having chronic plantar fasciitis were screened according to the inclusion criteria.(1)Clinical diagnosis of plantar fasciitis (2)Age group between 20 to 40years. (3)Painful symptoms lasting for more than 6 months. (4) Both male and female. Participants with ankle or foot surgery, congenital deformation of foot, lower limb spasticity, foot fracture in past 1 year, skin condition, neurological deficit were excluded from the study. A written informed consent was taken from participants and the procedure was explained by the investigator.

### **Randomization**

26 participants were randomly allocated to Group A (control) or Group B (experimental) by chit method without replacement. The allocation was conducted by the primary investigator prior to the baseline assessment. Group A received conventional therapy consist of ultrasound,

Tendoachilis stretching, Plantar fascia stretching and intrinsic muscle strengthening. Group B received conventional therapy along with Cyriax deep friction massage.

**Outcome measures**

Foot Function Index Scale [13, 14].

**INTERVENTION**

**Group A (control group)** received conventional therapy [12] which includes

**Ultrasound**

Intensity of 1watt/cm<sup>2</sup> was given with pulsed mode for 5 minutes [10,11]. Patients treated in cross sitting position with affected foot outside the plinth.

**Exercises**

The exercises program consisted of stretching of TA and plantar fascia 3 times for 30 seconds hold, towel curls for 3 times and 20 toe taps [2,4].

- a. **Stretching of Achilles tendon** was given to the patient in supine position. Therapist’s one hand stabilizes patient’s knee and stretching to the Achilles tendon was given by other hand by dorsiflexing the ankle.
- b. **Stretching of plantar fascia** was given in supine position. Therapist’s one hand stabilizes calcaneus and stretching to the plantar fascia was given by extending the toes at metatarsophalangeal joint.
- c. **Intrinsic muscle strengthening** which includes toe curls using towel for 3 times and 20 toe taps.

**Group B (experimental group)** received Cyriax deep friction massage along with conventional therapy.

Procedures for Cyriax deep friction massage technique:

**Patients position**

Supine, plantar fascia was in stretched position throughout the cyriax session. Stretch was maintained with one hand and the thumb of other hand was gliding the fascia laterally for 10 minutes [9,15,17].

**Therapist’s position**

Sitting at the foot end of the patient.

After completion of 2 weeks protocol, again Foot Function Index scale was taken and score of index was calculated. Then comparison of pre-treatment and post-treatment scoring was done.

**RESULTS AND DISCUSSION**

Pre-post analysis of Foot Function Index Scale in both control and experimental group was done using non-parametric test i.e. Mann-Whitney Test, which showed that there was significant improvement in the post intervention in both the groups.

Between the group analysis of control and experimental group, done by using Wilcoxon matched-pairs signed-ranks test between the differences of FFI which showed that there is significant improvement in the differences of the post intervention in experimental group.

**Table 1:** Demographic data

Gender Characteristics		Average
Female	n=20	10
Male	n=6	3
Age(years)	20 to 40	27.5

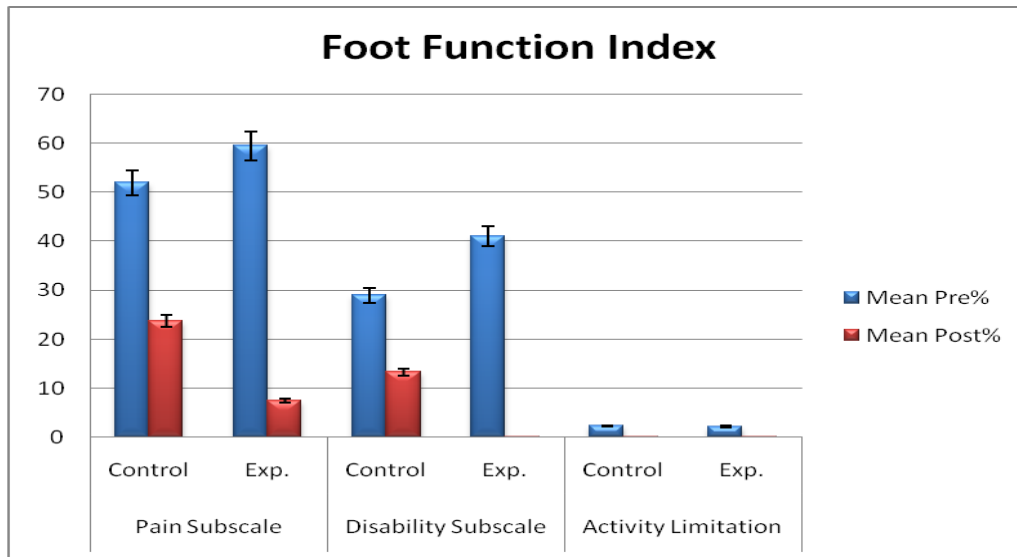
**Table 2:** Comparing mean values for the measured outcomes for both groups

<b>Foot Function Index</b>							
Domains		MEAN			P-Value	W-Value	U-Value
		Pre	Post	Difference			
Pain	Control	51.97±5.53	23.76±4.44	28.2±5.84	0.0002**	91	0.000
Subscale	Experimental	59.55±7.68	7.46±.69	52.08±6.89	0.0002**	91	(p<0.0001**)
Disability	Control	28.96±13.8	13.27±8.59	15.69±15.62	0.0681#	53	18.000

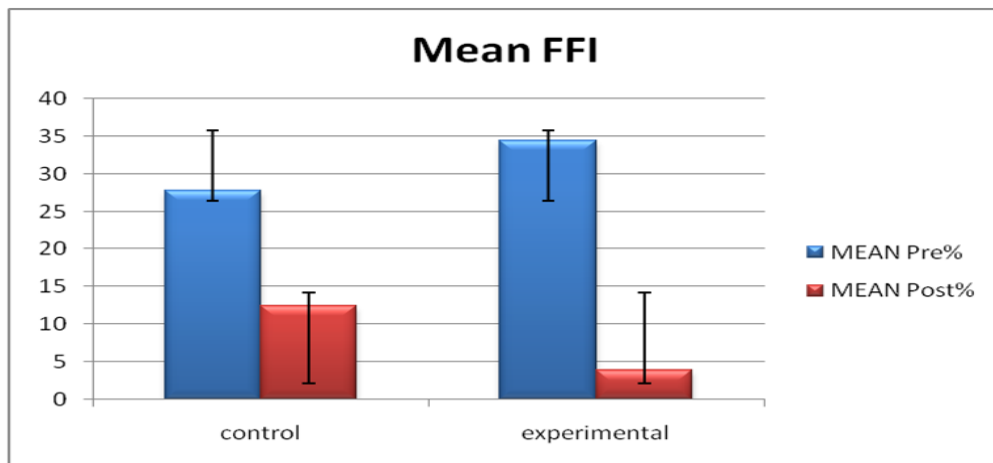
Subscale	Experimental	41.02±17.15	4.09±3.4	36.92±17.46	0.0002**	91	(p=0.0003**)
	Control	2.3±1.97	0.07±0.2	2.3±2.07	0.0002**	55	70.000
Activity Limitation	Experimental	2.15±3.1	0.07±0.2	2.07±2.9	0.0313*	21	(p=4696#)
	Control	27.74±6.04	12.41±3.41	15.33±30.54	0.0002**	91	8.000
<b>Mean FFI</b>	Experimental	34.39±7.83	3.85±2.2	30.54±13	0.0002**	91	(p<0.0001**)

±:SD \*\*:extremely significant \*:significant #:not significant

**Graph 1:** Showing mean values of 3 domains in Foot Function Index scale



**Graph 2:** Showing mean value of Foot Function Index scale



Within group analysis of pain subscale done by Mann Whitney test showed improvement in post treatment in both the groups but experimental group showed statistically significant improvement(p<0.0001)

Within group analysis of disability subscale done by Mann Whitney test showed improvement in post treatment in only experimental

group(p=0.0002). Intergroup analysis of disability subscale done by using Wilcoxon matched-pairs signed-ranks test showed statistically significant improvement(p=0.0003)

Within group analysis of activity limitation done by Mann Whitney test showed improvement in post treatment in both the groups but intergroup

analysis done by using Wilcoxon matched-pairs signed-ranks test was not significant

Within group analysis of MEAN FFI done by using Mann Whitney test showed improvement in both control( $p=0.0002$ ) as well as experimental group( $p=0.0002$ ). Intergroup analysis done by using Wilcoxon matched-pair signed-ranks test showed significant improvement with  $p$ -value  $<0.0001$

## DISCUSSION

This study was conducted to assess the efficacy of added effect of Cyriax deep friction massage over the conventional therapy in patients with plantar fasciitis.

26 participants with chronic plantar fasciitis were randomly allocated into experimental and control group in which the experimental group received Cyriax deep friction massage along with stretching of plantar fascia, stretching of tendoachilis, intrinsic foot muscle strengthening and ultrasound and control group received stretching of plantar fascia, stretching of tendoachilis, intrinsic foot muscle strengthening and ultrasound. Each patient received treatment session for thrice a week for 2 weeks. The outcome measure was Foot Function Index Scale.

In this study, as shown in graph 1, the changes observed in pain subscale are significant in both the groups, control ( $p=0.0002$ ) as well as experimental group( $p=0.0002$ ) but experimental group showed more significant improvement( $p<0.0001$ ).

Reduction in pain in control group is possibly due to the application of ultrasound which has its effect as : local rise in temperature could be used to accelerate healing and this thermal effect also help to reduce pain<sup>[11]</sup>. This inter group comparison of the study reveal that the pain sensitivity is significantly reduced when conventional treatment is combined with cyriax than conventional treatment alone. This improvement could be because of traumatic hyperemia, which helps to evacuate pain triggering metabolites also results in the enhancement of blood supply to the area. The hyperemia appears to diminish pain by increasing the speed of destruction of Lewis' P substance, probably due to the release of histamine. Stimulation of mechanoreceptors produces a

quantity of afferent impulses that stimulates a temporary analgesia<sup>[6,9,16]</sup>

Geoff Formosa, et al did the review to survey the impact of transverse friction massage on the plantar fasciitis, they reasoned that home exercise program, and also transverse friction massage were similarly adequate and no antagonistic impacts were accounted for.

On pre post analysis of activity limitation (graph 1) of FFI showed significant improvement in control ( $p=0.0002$ ) and experimental group ( $p=0.0313$ ) but the analysis between control and experimental group was not significant( $p=0.4696$ ).

This significant improvement could be because of several reasons. Firstly, reduction in pain. Secondly, Stretching of tendoachilis and plantar fascia increases the extensibility which is associated with increased range of motion <sup>[12]</sup>. Lastly, it might be because of increase in strength in intrinsic foot muscles by foot exercises <sup>[4]</sup>. The improvement in experimental group might also be because of application of cyriax as it moves the affected structure, which prevents or destroys adhesions and helps optimize the quality of the scar tissue <sup>[6, 16]</sup>.

Graph 1 also shows functional disability on FFI is evidently improved in experimental group ( $p=0.0002$ ) but not in control group ( $p=0.068$ ).

This significant improvement could be because of the application of cyriax deep friction massage which reduces pain, prevents adhesion formation and improves the extensibility of scar tissue which in turn helps to improve patient's functional disability. Therefore intergroup analysis between control and experimental group showed significant improvement ( $p=0.0003$ ).

In conclusion, graph 2 shows the overall FFI score improved in both groups, control ( $p=0.0002$ ) as well as experimental ( $p=0.0002$ ) but the intergroup analysis showed significant improvement in experimental group ( $p<0.0001$ ).

Michael F. Joseph, et al surveyed the impact of trasverse friction massage on tendinopathy. They reasoned that there is some confirmation of advantage of transverse friction massage at the elbow in mix with Mill's control, and also for Supraspinatus tendinopathy within the sight of outlet impingement and alongside joint mobilization.

## CONCLUSION

The study concluded that clinical interventions consisting of cyriax deep friction massage along with conventional therapy was more effective in improving functional ability in patients with chronic plantar fasciitis.

The limitation for this study was the application of cyriax deep friction massage is based on clinical judgment and no method was found to quantify or measure the application of frictions. The study can be done for a longer duration.

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