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A COMPARITIVE STUDY ON EFFECTIVENESS OF TAPING WITH IONTOPHORESIS AND TAPING ALONE IN CHRONIC PLANTAR FASCITIS

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ABSTRACT

Background: Plantar fasciitis is a painful condition caused by microtrauma to plantar fascia due to overuse. It is a most common cause of heel pain in runners. Various studies proved taping and Iontophoresis as effective in the treating plantar fasciitis. But there are no studies comparing the combined effect of iontophoresis with taping and taping alone in the treatment of plantar fasciitis.

Methods: 50 patients suffering from plantar fasciitis who met the inclusion criteria were selected. The subjects were randomly divided into two groups i.e. Group A and Group B. Group A received taping, iontophoresis with plantar fascia stretching. Group B received taping and plantar fascia stretching. A total of 6 treatment sessions were given on alternate days over a period of two weeks for both the groups.

Results: VAS and FFI scores across baseline and post intervention showed a significant improvement statistically in their mean scores between Groups A and B ($P < 0.05$). Between group comparison of VAS and FFI scores, it showed that subject treated with Iontophoresis in combination with taping and plantar fascia stretch (Group A) had significant improvement in VAS and functional ability when compared to subjects treated with taping and plantar fascia stretching alone (Group B).

Conclusion: Iontophoresis along with Taping and plantar fascia stretching gave an additional benefit when compared with Taping and plantar fascia stretching alone in reducing pain and improving function in plantar fasciitis.

Keywords: Plantar Fasciitis, Taping, Stretching, Iontophoresis, VAS, FFI

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INTRODUCTION

Plantar fasciitis is a painful condition caused by microtrauma to plantar fascia due to overuse. It occurs as a result of inflammation of plantar aponeurosis at its attachment of tuberosity of calcaneum [2]. static support for longitudinal arch of the foot is by plantar fascia. Strain on the arch exerts maximal pull on plantar fascia origin at the medial process of the calcaneal tuberosity. The plantar fascia act as shock absorber by elongation due to loads, but its ability to elongate is reduced with age. Metatarsophalangeal joints pull the plantar fascia distally by passive extension which increases the arch height. Repeated stress of this nature causes inflammation of the plantar fascia [1,2].

It is common in sports which involve running, dancing or jumping. It is a most common cause of heel pain in runners. The chronic or overuse type of plantar fasciitis usually results from abnormal pronation of the subtalar joint creating micro tears in the plantar fascia. The medial aspect of the plantar fascia is most often affected at its insertion on the medial tuberosity of the plantar surface of the calcaneum [3]. The pain is worst early in the morning and often improves with activity. It is estimated that 11% to 15% of all foot conditions requiring medical attention can be attributed to this condition [3,4]. It is manifested by pain over the ball of the heel, tenderness on plantar aspect of the heel, slight swelling at the attachment of plantar fascia.

Various treatment strategies including orthosis, stretching, taping, iontophoresis, extracorporeal shockwave therapy, laser therapy and drug therapy in the form of systemic medication, percutaneous injection and topical application have been investigated and have shown variable clinical benefit. Various studies have been done using taping as an intervention in the treatment of plantar fasciitis and have concluded taping as an effective form of intervention in the treatment of plantar fasciitis [5,6]. Other studies have also been done using iontophoresis as an intervention in the treatment of plantar fasciitis and have shown significant improvement with iontophoresis [7]. But there are no studies which have been done comparing the combined effect of iontophoresis with taping and taping alone in the treatment of plantar fasciitis by relieving pain and increasing function. Hence this study compares the efficacy of taping combined with iontophoresis versus taping alone to reduce pain and improve function in patients with plantar fasciitis.

MATERIALS AND METHODS

A sample size of 50 subjects with age group of 30-60 years, both male and female subjects were taken with 25 subjects in each group suffering from plantar fasciitis referred to physiotherapy by a physician/orthopedic surgeon in and around Mangalore. The subjects with unilateral symptomatic chronic plantar fasciitis (3 months or more) were randomly divided into two groups i.e. Group A and Group B; each group consisted of 25 patients. Pre test and post test was conducted on Group A and Group B by using

VAS(Visual Analog Scale) for assessing pain and FFI(Foot Function Index) for assessing pain intensity and disability. Group A received taping, iontophoresis with plantar fascia stretching. Group B received taping and plantar fascia stretching. A total of 6 treatment sessions were given on alternate days over a period of two weeks. Subjects who are allergic to acetic acid and tape, contraindicated for iontophoresis, specific pathology from trauma or other co-existing symptomatic foot pathology requiring treatment, calcaneal stress fracture, gout, bone tumor, osteomyelitis, diabetes, surgery for plantar fasciitis within previous 6 months, new orthotics or corticosteroid treatment in the previous month were excluded from the study.

PROCEDURE

Taping: With the ankle slightly plantar flexed, adhesive felt strip was applied at the posterior aspect of the heel and firmly pulled towards to metatarsal head. To eliminate binding, a 'V' shape was cut on both the edges of the adhesive felt where the felt crossed the heel area. Once, adequate tension was applied, the adhesive felt was pressed against the plantar aspect of the foot. A 7.5 cm adhesive anchor strip was applied from the medial aspect of first metatarsal around the heel to the lateral aspect of the fifth metatarsal head. A 5 cm elastic tape around the mid-foot area was applied. This circular strip started on the dorsal aspect, went lateral and continued across the plantar aspect of the foot's medial position, crossing the tape's end. A strip of tape was used to reinforce the tape [8]. A total of 6 treatment sessions were given on alternate days over a period of two weeks.

Iontophoresis: The patient will be positioned in sitting with leg supported in a foot tub. One electrode will be placed on the site of maximum tenderness on the plantar aspect of the foot. Other electrode will be placed on the forefoot. The following parameters will be used such as 5% acetic acid will be delivered using iontophoresis drug delivery system (Technomed Electronics, Chennai). Dosage applied will be upto 4 mA and a total dosage of 40 mA for a period determined by patient's sensitivity. A total of 6 treatment sessions will be delivered on alternating days over a period of two weeks.

Plantar fascia stretching: The patient crossed the affected leg over the contra lateral leg. While placing the fingers across the base of the toes, the patient pulled the toes back toward the shin until he or she felt a stretch in the rch or planter fascia. The patient confirmed that the stretch was correct by palpating tension in the planter fascia. Patients were given planter fascia stretching for duration of one minute repeated 10 times with a rest period of 30 seconds in between each stretch [9].

RESULTS

This study was done to compare the efficacy of taping combined with iontophoresis versus taping alone to reduce pain and improve function in patients with plantar fasciitis. Comparison of all the components between Group A pre and post treatment and Group B pre and post treatment was

done by using Mannwhitney U- test (Non-parametric tests).

The pain relief was measured using Visual Analogue Scale (VAS). The subjects showed significant pain relief within Group A and Group B respectively. It also showed significant pain relief within Group A and Group B respectively. It also illustrated that there was a significant difference in Group A from 8 to 2 than in Group B from 8 to 4 when compared. FFI-Sub and Total Score was used to assess the improvement in pain and function. The subjects showed significant improvement within Group A and Group B respectively. It was also demonstrated that there was a very significant improvement in Group A from an average of 89 to 25 than in Group B from an average of 111 to an average of 68 when compared. In the Foot Function Index, pain intensity and the disability had reduced demonstrated significant improvement within Group A and Group B separately. When compared, Group A showed better reduction in pain and improvement in disability than in Group B. VAS and FFI scores across baseline and post intervention showed a significant improvement statistically in their mean scores between Groups A and B ($P < 0.05$)

Table 1.1: Comparison between group a and group b

COMPONENTS	GROUP-A		GROUP-B	
	PRE	POST	PRE	POST
VAS	8	2	8	4
PAIN	35	11	38	25
DISABILITY	56	15	73	42
TOTAL	89	25	111	68

Table 1.2: Comparison of average improvement of Group A and Group B

	Average Improvement-Group A	Average Improvement-Group B	U-Value	P-Value	Result
VAS	6	4	21	0.000	$P < 0.05$ sig
PAIN	24	33	1.5	0.000	$P < 0.05$ sig
DISABILITY	41	31	28	0.000	$P < 0.05$ sig
TOTAL	64	41	8	0.000	$P < 0.05$ sig

DISCUSSION

This study was carried out using Taping and iontophoresis along with plantar fascia stretching on the subjects with plantar fasciitis. A total of 50 patients were included which were randomly divided into 25 in each group (i.e. Group A and Group B). Group A received taping, iontophoresis and plantar fascia stretching four times a week for a period of two weeks and while Group B received taping and plantar fascia stretching four times a week for a duration of two weeks.

The maximum number of subjects having plantar fasciitis was to be females (52%). This is in accordance with the study by Riddle D L et al that suggests, plantar fasciitis is more likely to occur in persons who are obese, who spend most of the day on their feet, or who have limited ankle flexion [10]. In the present study, maximum number of

subjects were in the age group of 50 to 60 years which accounts for 40% of the sample size, the remaining 24% was from an age group of 40 to 50 years and 32% from 30 to 40 years. This is in accordance with a study done by Lapidus P W et al who reports prevalence in the 5th decade, with a female to male ratio of 1:1.

In the present study, it is proved that iontophoresis is effective in treating plantar fasciitis in combination with taping. This is supported by Ivano A Costa et al who conducted study on female soccer players with chronic plantar fasciitis. The treatment included acetic acid iontophoresis and a combination of rehabilitation protocols, ultrasound, athletic taping, custom orthotics and soft tissue therapies with symptom resolution and return to full activities within a period a period of 6 weeks. There was no significant return of symptoms post follow-up at 2 months. Acetic acid iontophoresis showed promising results. The combination of acetic acid iontophoresis with conservative treatments may promote recovery within a shorter duration compared to the use of one-method treatment approaches.

In the present study, it is proved that taping is very beneficial and effective in plantar fasciitis to reduce pain. Likewise, a study demonstrated by Landorf K B et al evaluated the short-term effectiveness of low-Dye taping in relieving pain associated with plantar fasciitis. In this comparative study 65 participants with plantar fasciitis participants who did not receive taping. They found that in the short term, low-Dye taping significantly reduced the pain associated with plantar fasciitis. These findings were the first quantitative results to demonstrate the significant therapeutic effect of this treatment modality in relieving the symptoms associated with plantar fasciitis.

In the present study, it is also proved that plantar fascia stretching is helpful in reducing pain and re-occurrence of the same. This is in accordance with the study performed by Benedict F Digiovanni using two different stretching approaches such as plantar fascia stretching and tendoachillis stretching protocol in the treatment of chronic plantar fasciitis. One hundred and one patients who had chronic plantar fasciitis for a duration of at least 10 months were randomized into one of two treatment groups. The mean age was forty-six years. The patients received instructions for either a plantar fascia tissue-stretching program (Group A) or an Achilles tendon-stretching program (Group B). All patients completed the pain subscale of the Foot Function Index and a subject-relevant outcome survey that incorporated generic and condition-specific outcome measures related to pain, function, and satisfaction with treatment outcome. The patients were reevaluated after eight weeks. The pain subscale scores of the Foot Function Index showed significantly better results for the patients managed with the plantar fascia stretching program with respect to item 1 (worst pain; $p = 0.02$) and item 2 (first steps in the morning; $p = 0.006$). The outcome measure revealed that the plantar fascia stretching programme produced beneficial effect in reducing pain, improving function and high rate of satisfaction than in patients with

plantar fasciitis.

CONCLUSION

Iontophoresis along with Taping and plantar fascia stretching gave an additional benefit when compared with Taping and plantar fascia stretching alone in reducing pain and improving function at the 4th week when compared to the baseline values in subjects with plantar fasciitis.

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