Original Research Paper

Volume - 12 | Issue - 01 | January - 2022 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Orthopaedics

"A PROSPECTIVE COMPARATIVE STUDY OF LOCAL STEROID INJECTION VS DRY NEEDLING FOR PLANTAR FASCIITIS"

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ABSTRACT

BACKGROUND: Plantar fasciitis is one of the most common conditions of heel pain among adults. Most common affected age group being 40-60 years and it is a leading cause of occupational impairment. Non-invasive and invasive modalities are the two basic types of treatment. Invasive treatment modalilities like local injections, surgical treatment are advised for patients non-responding to non-invasive conservative treatment modalities. Local Steroid Injection (LSI) is the most common invasive treatment used whereas Dry Needling (DN) is proposed as a new modality of treatment recently.

OBJECTIVES: The aim of this study is to evaluate the effectiveness of Dry Needling versus Local Steroid Injection for Plantar Fasciitis using short form of Foot Function Index Revised (FFI-R).

METHODS: This is prospective randomized, single blind, controlled study. Fifty patients who were clinically and radiologically (USG) confirmed to have idiopathic plantar fasciitis were enrolled in the study after informed consent. Patients were randomized and assigned into 2 groups of 25 patients each. Group I was managed by Local Steroid Injection (LSI) and Group II was managed by Dry Needling (DN). Patients were followed every 4 weeks up to 12 weeks. They were assessed clinically and functionally based on short form of FFI-R

CONCLUSION: Short form of Foot Function Index Revised (FFI-R) is a quick, reliable and patient friendly outcome measurement tool for plantar fasciitis. Both Local Corticosteroid Injection and Dry Needling are effective treatment in refractory cases of Plantar Fasciitis in adjunct to non-invasive conservative treatment modalities. Dry Needling is a safe and reliable procedure for treating refractory cases of Plantar Fasciitis. Even though corticosteroid injection is the most effective treatment for short term symptomatic relief (at 4 weeks), it is found that outcomes of Dry Needling are comparable with the efficacy of corticosteroid injection in the medium term follow-up (12 weeks). Dry Needling has greater physiological compatibility than corticosteroid injection in terms of ability to induce possible healing process in plantar fasciitis and devoid of any long term complication associated with corticosteroid injection.

KEYWORDS : Plantar Fasciitis (PF), Dry needling (DN), Local Steroid Injection (LSI), FFI-R short form.

1.INTRODUCTION

Plantar Fasciitis (PF) is the result of collagen degeneration of the plantar fascia at the origin, the calcaneal tuberosity of the heel as well as the surrounding perifascial structures[1]. Plantar fascia is a band of connective tissue extending from calcaneum to metatarso-phalangeal joint and provides support for longituidinal arch of the foot. It is the most prevalent cause of pain in inferior part of heel[2] and accounts for 12%-15% of all cases of foot pain which require treatment[3]. Plantar fasciitis is one of the most common conditions affecting heel among adults[4] and most common age group affected being 40-60 years[5]. The aetiology of the condition is believed to be mechanical and inflammatory in origin, Histo pathology is suggestive of myxoid degeneration, micro tears in fascia and angio fibroblastic hyperplasia[1]. Though it is a self limiting condition 10% of patients develop chronicity[6] patients usually presents with complaints of heel pain gradual in onset and maximum during first few steps in the morning with variation depending up on the activity of the patient. Plantar fasciitis can affect both athletes and sedentary people particularly middle aged and older individuals[7], intrinsic risk factors include obesity, pes planus, pes cavus and shortened achilles tendon. Extrinsic risk factors include walking on hard surfaces or barefoot, military training, long standing and poor foot wear[8], people who walk more during work are shown to be at a higher risk for developing this condition[9]. This condition is usually diagnosed by patient's history and by clinical examination. USG is useful in diagnosing the condition, plantar fascia thickness more than 4.0mm is considered abnormal[10,11] Numerous treatment modalities have been used for management of plantar fasciitis. Modalities include orthosis, stretching exercises, ESWD in non invasive techniques and local steroid infiltration, dry needling, needle fasciotomy, PRP, surgical release of fascia in invasive methods, but still there is no standard management protocol and treatment is mainly surgeon's choice. In less symptomatic situations, conservative treatments like splinting, orthosis are more popular, invasive methods are used if splinting and NSAIDs etc have failed. Most commonly used is local steroid infiltration, steroids have been used to treat plantar fasciitis since 1950's[12] both by orthopaedic surgeons and rheumatologists[13]. Advantages of steroid included low cost, ease of administration and rapid pain relief, drawbacks of injecting the heel with steroid included atrophy of fat pad, calcaneal osteomyelitis, plantar fascia weakening and rupture[14]. Dry Needling (DN) is proposed as a new modality of treatment recently. A meta-analysis of seven trials concluded that trigger point dry needling is effective in patients with Plantar Fasciitis[15]. Dry needling is typically used to treat muscles, ligaments, tendons, subcutaneous fascia, scar tissue, peripheral nerves, and neurovascular bundles for the management of a variety of neuromusculoskeletal pain syndromes[16-20]. Needling therapies may be a reasonable non-pharmacologic adjunct therapy for the reduction of pain in individuals with PF who are already receiving manual therapy and exercise. Several studies were done to compare different modalities of management but no single treatment emerged supported by highest level of evidence. In our study we would like to assess the efficacy of dry needling (DN) Vs local steroid injection (LSI) for plantar fasciitis, in those patients treated with non invasive conservative treatment modality and continues to have chronic persisting symptoms.

2. MATERIALS AND METHODS :

2.1 Source Of Data

The study was conducted on 50 patients with clinically and radiologically confirmed cases of plantar fasciitis from Jan 2020 to Aug 2021, in Department of Medicine and Department of Orthopaedics, INHS Sanjivani, Naval Base, Kochi.

2.2 Inclusion Criteria

A. Age: Above 18 years of either sex with clinically diagnosed cases of unilateral planter fasciitis
B. Patients with pain and tenderness centred on the medial tubercle of the calcaneum on weight bearing
C. pain of more than 3 months duration and patient symptomatic even with prior non conservative treatment like oral analgesics, using orthoses, insoles, pads, non invasive physiotherapy modalities

2.3 Exclusion Criteria

A. Previous history of dry needing or steroid injection.
B. Pain was abated >50% in last 3 months with non invasive conservative treatment
C. Chronic disease, such as diabetes mellitus, chronic renal failure, potential arthritis, rheumatoid arthritis, generalized polyarthritis seronegative arthropathy, neurologic impairments, peripheral vascular disease, tumors of the foot or ankle.

D. Known hypersensitivity to lidocaine hydrochloride or corticosteroids, allergies to drugs or metal.
E. Current skin or soft tissue infection near the possible injection site.
F. Patients with any bleeding disorder or on anti coagulant drugs, patients with bilateral planter fasciitis.
G. Previous local surgery, a history of local trauma or other musculoskeletal condition that might impair function of the foot or ankle. Difficulty in ambulation due to stroke, foot surgery, etc. Amputation, spinal cord injury
H. Pregnancy.
I. Patients in whom the baseline questionnaire cannot be completed due to cognitive difficulties

2.4 Study Population And Study Groups

Clinically diagnosed cases of unilateral Plantar fasciitis were considered eligible for inclusion in this study. Ultrasonography was done to provide objective evidence. Thickness of plantar fascia more than 4.0mm is considered abnormal. Patients meeting the inclusion and exclusion criteria are selected for the study. All the patients were explained about the aims of the study, the methods involved and an informed written consent was obtained before being included in the study. Patient enrollment was followed by the opening of an envelope containing treatment assignments, with the appropriate therapy being given immediately. The number of patients randomly allocated to dry needling or local steroid injection was used in an intent-to-treat analysis. The patients were randomly divided into 2 study groups of 25 patients each.

2.5 Clinical And Functional Assessment

A careful history was elicited from the patient to reveal the onset of symptoms, progression, diurnal variation, duration, severity of the condition and other associated conditions. The patients were then assessed clinically to evaluate their general condition and the local condition.

The data was collected from patients using the FFI-R short-form questionnaire[21]. The FFI-R short form consists of 34 questions that subjectively ask patients about their foot function in regard to pain, stiffness, difficulty with everyday tasks, activity limitations, and social issues. All items used a six-point response scale and referred to the past week time period. Although the scales were similar, each was modified as appropriate for each of the five areas of measurement (for example pain subscale 1=no pain, 2=mild pain, 3=moderate pain, 4=severe pain, 5=very severe pain, 6=worst pain imaginable, 7=doesn't apply) A higher score indicates a poorer perception of foot function.

2.7 Study Group I (local Steroid Injection)

The site of tenderness of plantar foot muscles is marked according to point of maximum tenderness on physical examination and patient complaints. Prior to injection, the skin was sterilized with povidone-iodine. Palpate the most anterior aspect of the medial plantar calcaneal tubercle, and insert the needle (22-gauge, 1.5-inch needle) at this site through medial approach, Advance the needle until it reaches the most anterior (distal) aspect of the plantar medial calcaneal tuberosity. Then Local Steroid Injections of 40mg triamcinolone acetonide with 2ml of 2% lignocaine was injected as per standard technique.

2.8 Study Group Ii (dry Needling)

In Dry needling group with patient in prone position, similar to steroid injection group, tender point is identified and marked in plantar foot muscles, skin was cleaned with povidone-iodine and needle of 28 gauge was used to carry out the procedure. Needle was directed through skin and inserted in to the fascia origin at calcaneous which is considered as the most painful area in plantar fasciitis. The needle was rotated and moved in-out multiple times around the area via reciprocating motions. After removal of the needle insertion site was compressed firmly to prevent bleeding.

2.9 Post Procedure Period

Patient education is the single most important means of preventing and treating plantar fasciitis. We advised participants to modify activities that can aggravate plantar fasciitis (eg, walking, running, and jumping) and avoid other high impact activities for three weeks following the injection. Participants were asked to use arch support with cushioned heel and complete a daily calf stretching programme to ensure that the trial better represented normal clinical practice. They all had a physician directed physiotherapy exercise program, which included strengthening, and stretching. Supervised therapy for patients was used only if patients had difficulty regaining motion or strength or had unusual pain complaints after injection/dry needling.

2.10 Follow Up

The Patients were followed up at regular intervals of 4 weeks up to 12 weeks to assess clinical and functional improvement based on short form FFI-R (Initially it was planned to follow up till 24 weeks but due to drop out of patients after 12 weeks in both groups. Study results were analysed based on outcome upto 12 weeks). The outcomes analysis was based on the patient questionnaire results. The post-procedural data were collected at 4 and 12 weeks after the patient's initial injection date. The change in FFI scores in respect to five subscales are used for calculating outcome. If symptoms recur following either the steroid injection or dry needling, participant should contact research team. Fresh USG will be done to confirm the severity and discuss further treatment options. This may include even surgical release of fascia.

2.11 Statistical Methods:

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. In all analyses, $p < .05$ indicated statistical significance. The collected raw data were entered into a Microsoft Excel spreadsheet to calculate each subscale (pain, stiffness, difficulty, activity limitation, and social issues) of the short-form FFI-R. The 5 subscale scores were summed to determine a cumulative foot function score. The data were compared within and between the 2 groups. The Kolmogorov-Smirnov test was used for assessing normality of the distribution. Normally distributed data were analyzed by paired samples t testing and independent samples t testing. Dependent variables that were not distributed normally were analyzed by the Wilcoxon signed-rank test, whereas independent variables were analyzed by the Mann-Whitney U test. Chi-square has been used to find the significance of study parameters on categorical scale between two groups.

Statistical software: The Statistical software namely SAS 9.2, SPSS 16.0, socscistatistics calculators and MedCalc 9.0.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate tables

3.RESULTS

Table1: Age distribution of patients studied

Age in years	Group I (Local Steroid Injection)		Group II (Dry Needling)	
	No.	%	No.	%
20-30	03	12.0	02	08.0
31-40	11	44.0	11	44.0
41-50	09	36.0	11	44.0
51-60	02	08.0	01	04.0
Total	25.0	**100.0**	25.0	**100.0**
Mean±SD	**39.24 ± 7.51**		**39.36 ± 6.62**	

The *t*-value is -0.05869. The *p*-value is .953443.The result is not significant at $p < .05$. Mean age of this study is 39.3 ± 7.08

Table 2 : Baseline characteristics by treatment assignment.

Baseline Character	Group I (Local Steroid Injection)	Group II (Dry Needling)
Age (Mean ± SD)	39.24 ± 7.51	39.36 ± 6.62
	The *p*-value is .953443.The result is not significant at $p < .05$. Mean age of this study is 39.3 ± 7.08	
Gender: male/female	05/20	06/19
Laterality : right/left	14/11	16/09
Duration of symptoms	4.72 ± 1.11	4.68 ± 1.22
	The *p*-value is .906244.The result is not significant at $p < .05$. Mean duration of symptoms of this study is 4.7 ± 1.17	
Cumulative short form FFI-R score	126.2 ± 16.25	126.24 ± 14.26
	The *p*-value is .9928.The result is not significant at $p < .05$. Mean cumulative score of this study is 126.22 ± 15.29	

Table 3: Occupation distribution in two groups (LSI group and DN group) of patients studied

Occupation	Group I (Local Steroid Injection)		Group II (Dry Needling)	
	No	%	No	%
Farmer	2	8.0	4	16.0
Homemakers	15	60.0	14	56.0
Private Business	4	16.0	4	16.0
Government servent	2	8.0	2	8.0
Student	2	8.0	1	4.0
Total	25	100.0	25	100.0

Table 4: Short FFI-Revised score in plantar fasciitis patients before and after 4 weeks in LSI group and DN group

Short FFI-Revised	Group I (Local Steroid Injection)			Group II (Dry Needling)			DIFFERENCE I vs II (+ indicate improvement, - indicate deteriotion)	
	Before (SD)	After 4 weeks (SD)	P value	Before (SD)	After 4 weeks (SD)	P value	Group I (%)	Group II (%)
Pain	27 (3.14)	10.24 (1.86)	**<.00001**	27 (3.34)	12.12 (2.06)	**<.00001**	16.76 (62)	14.88 (55.1)
Stiffness	29.2 (4.17)	9.4 (1.38)	**<.00001**	28.16 (3.14)	11.08 (2.24)	**<.00001**	19.8 (67.8)	17.08 (60.6)
Difficulty	40.6 (5.15)	18.92 (2.65)	**<.00001**	40.24 (4.11)	24 (3.67)	**<.00001**	21.68 (53.3)	16.24 (40.35)
Activity limitation	11.88 (0.58)	5.24 (0.94)	**<.00001**	12 (0.69)	8 (1.09)	**<.00001**	6.64 (55.8)	4 (33.3)
Social issues	18.24 (3.66)	9.4 (1.38)	**<.00001**	18.88 (3.25)	10.2 (1.49)	**<.00001**	8.84 (48.4)	8.68 (45.9)
Cumulative score	126.2 (16.25)	53.12 (7.20)	**<.00001**	126.24 (14.26)	65.4 (10.11)	**<.00001**	73.08 (58.4)	60.84 (48.1)

Table 5: Short FFI-Revised score in plantar fasciitis patients before and after 12 weeks in LSI group and DN group

Short FFI-Revised	Group I (Local Steroid Injection)			Group II (Dry Needling)			DIFFERENCE I vs II (+ indicate improvement, - indicate deterioration)	
	Before (SD)	After 12 weeks (SD)	P value	Before (SD)	After 12 weeks (SD)	P value	Group I (%)	Group II (%)
Pain	27 (3.14)	15.28 (2.40)	**<.00001**	27 (3.34)	13.76 (3.03)	**<.00001**	11.72 (43.4)	13.24 (49.0)
Stiffness	29.2 (4.17)	11.56 (1.98)	**<.00001**	28.16 (3.14)	11 (1.91)	**<.00001**	17.64 (60.4)	17.16 (60.6)
Difficulty	40.6 (5.15)	27.44 (4.48)	**<.00001**	40.24 (4.11)	26.8 (4.47)	**<.00001**	13.16 (32.9)	13.44 (33.4)
Activity limitation	11.88 (0.58)	7.48 (1.67)	**<.00001**	12 (0.69)	8.12 (1.45)	**<.00001**	4.4 (37)	3.88 (32.3)
Social issues	18.24 (3.66)	9.4 (1.57)	**<.00001**	18.88 (3.25)	10.64 (1.80)	**<.00001**	8.84 (48.4)	8.24 (43.6)
Cumulative score	126.2 (16.25)	70.4 (9.09)	**<.00001**	126.24 (14.26)	70.28 (11.64)	**<.00001**	55.8 (44.2)	60.84 (44.3)

Table 6: Short FFI-Revised score in plantar fasciitis patients after 4 and 12 weeks in LSI group and DN group

Short FFI-Revised	Group I (Local Steroid Injection)			Group II (Dry Needling)			DIFFERENCE I vs II (+ indicate improvement, - indicate deterioration)	
	After 4 weeks (SD)	After 12 weeks (SD)	P value	After 4 weeks (SD)	After 12 weeks (SD)	P value	Group I (%)	Group II (%)
Pain	10.24 (1.86)	15.28 (2.40)	**<.00001**	12.12 (2.06)	13.76 (3.03)	**.00197**	-5.04 (49.2)	-1.64 (13.5)
Stiffness	9.4 (1.38)	11.56 (1.98)	**<.00001**	11.08 (2.24)	11 (1.91)	.73141	-2.16 (22.9)	0.08 (0.7)
Difficulty	18.92 (2.65)	27.44 (4.48)	**<.00001**	24 (3.67)	26.8 (4.47)	**<.00001**	-8.52 (45)	-2.8 (11.6)
Activity limitation	5.24 (0.94)	7.48 (1.67)	**<.00001**	8 (1.09)	8.12 (1.45)	.52377	-2.24 (42.7)	-0.12 (1.5)
Social issues	9.4 (1.38)	9.4 (1.57)	1	10.2 (1.49)	10.64 (1.80)	.09383	0 (0)	-0.44 (4.3)
Cumulative score	53.12 (7.20)	70.4 (9.09)	**<.00001**	65.4 (10.11)	70.28 (11.64)	**.00036**	-17.28 (32.5)	-4.88 (7.4)

Table 7: Short FFI-Revised score comparison in plantar fasciitis patients between LSI group and DN group after 4 and 12 weeks

Short FFI-Revised	PRE TREATMENT			AFTER 4 WEEKS			AFTER 12 WEEKS		
	LSI	DN	P value (I VS II)	LSI	DN	P value (I VS II)	LSI	DN	P value (I VS II)
Pain	27 (3.14)	27 (3.34)	1	10.24 (1.86)	12.12 (2.06)	**.00176**	15.28 (2.40)	13.76 (3.03)	.060665
Stiffness	29.2 (4.17)	28.16 (3.14)	.334691	9.4 (1.38)	11.08 (2.24)	**.003048**	11.56 (1.98)	11 (1.91)	.324857
Difficulty	40.6 (5.15)	40.24 (4.11)	.790217	18.92 (2.65)	24 (3.67)	**.00001**	27.44 (4.48)	26.8 (4.47)	.622713
Activity limitation	11.88 (0.58)	12 (0.69)	.5892	5.24 (0.94)	8 (1.09)	**.00001**	7.48 (1.67)	8.12 (1.45)	.163753
Social issues	18.24 (3.66)	18.88 (3.25)	.525628	9.4 (1.38)	10.2 (1.49)	.060612	9.4 (1.57)	10.64 (1.80)	**.014622**
Cumulative score	126.2 (16.25)	126.24 (14.26)	.992807	53.12 (7.20)	65.4 (10.11)	**.000014**	70.4 (9.09)	70.28 (11.64)	.9684

This Study was conducted in INHS Sanjivani, Kochi. Period of study was 20 months from Jan 2020 to Aug 2021. Fifty (50) patients of Plantar Fasciitis (PF) were included in this study; there were 39 females and 11 males. Their mean age was 39.3 ± 7.08 (26–54 years). Majority were Right sided CTS in 30/40(60%). Their duration of illness was 4.7 ± 1.17 (3–7 months). Most of the patients were homemakers 29/50(58%). They were randomly assigned into two groups. There was no statistical difference in baseline characters and short FFI-R score between two groups. In group I (LSI) there were 20 females and 05 males, their mean age was 39.24 ± 7.51 years (26–54 years) and disease duration was 4.7 ± 1.11 months (4–7 months). In group II (DN) there were 19 females and 06 males, their mean age was 39.36 ± 6.62 years (26–52 years) and disease duration was 4.68 ± 1.22 months (4–7 months).

In group I (Local Steroid Injection) The FFI-R scores at 4 and 12 weeks revealed improvement in all subcategories (Tables 4 and 5). Statistical significance, determined by a p value of <.05, was obtained in all 5 subgroups and in the cumulative scores at 4 and 12 weeks of follow-up (Tables 4 and 5). At 4 weeks of follow-up, pain had improved 62%, difficulty 53%, the activity limitation 56%, and social issues 48%; the stiffness was the most improved at 68%. The 12-weeks follow-up data showed there was loss of improvement gained at 4 weeks, suggestive of deterioration finally showing 43% improvement in pain, 60% in stiffness, 33% in difficulty, 37% in activity limitation, 48% improvement in social issues when compared to pre-treatment scores. On average, the FFI-R scores had improved by 58% at 4 weeks and 44% at 12 weeks. The FFI-R score from the 4 weeks to 12 weeks follow-up assessment showed an statistically significant (p <. 05) loss of improvement gained at 4 weeks in terms of pain, stiffness, difficulty, activity limitation subscale and cumulative scores.

In group II (Dry Needling) The FFI-R scores at 4 and 12 weeks revealed improvement in all subcategories (Tables 4 and 5). Statistical significance, determined by a p value of <.05, was obtained in all 5 subgroups and in the cumulative scores at 4 and 12 weeks of follow-up (Tables 4 and 5). At 4 weeks of follow-up, pain had improved 55%, stiffness 61%, difficulty 40%, activity limitation 33 % and social issues 46%. The 12 weeks follow-up data improvement achieved at 4 weeks were maintained except in difficulty subscale, in which improvement in score dropped from 40% to 33% ; other subscales showed 49% improvement in pain, 61% in stiffness, 32% in activity limitation, and 44% improvement in social issues. On average, the FFI-R scores had

improved by 48% at 4 weeks and 44% at 12 weeks. The assessment showed loss of improvement between 4th week to 12th week follow up, it was statistically significant in terms of pain, difficulty and cumulative scores.

At 4 weeks follow up even though both the groups showed greater efficacy within the group ($p < .0001$; Table 4), on comparison between the groups the local corticosteroid injection group showed statistically significant improvement over the dry needling group at 4 weeks in terms of pain, stiffness, difficulty, activity limitation and cumulative scores ($p < .05$; Table 7). On further follow up between the 4th week and 12th week, the local corticosteroid group showed significant loss of efficacy within the group in terms of pain, stiffness, difficulty, activity limitation and cumulative scores (Table 6) and the dry needling showed statistically significant loss of efficacy in terms of pain, difficulty and cumulative scores (Table 6). However at 12th week follow up, the FFI-R score calculated was comparable between both groups except in social issues subscale (Tables 7).

Illustration 1:

Tender point marked **Steroid injection by standard technique**

4. DISCUSSION

Most authors believe Plantar Fasciitis is self limiting disease which could be managed with non invasive conservative treatment modalities. In some cases plantar fasciitis becomes refractory to non conservative methods of treatment. The treatment options in such refractory cases with chronic persisting symptoms are not supported by strong clinical evidence. Hence our present study was undertaken to compare the efficacy of dry needling (DN) vs local steroid injection (LSI) for Plantar Fasciitis. This Study was conducted in INHS Sanjivani, Kochi. Period of study was 20 months from Jan 2020 to Aug 2021. Fifty patients were included in this study and randomly assigned to two groups, group I (LSI) and group II (DN).

Our study revealed the mean age of patients in this study to be 39.24 ± 7.08 (26–54 years) years. It is comparable to the peak age of development for PF in general population i.e. 40-60 years. There was female predominance of about 78% of study population. Majority of our patients are housewives/ homemakers (58%). The patients in the study suffered from symptoms in an average for about 4.7 months and they had failed to respond to non invasive conservative treatments before inclusion to the study. After randomization the study population in both groups I and II were comparable. There was no statistical significant difference noted in between the groups.

The use of the FFI score is a validated and useful method for evaluating PF[22,23], In 2006, the FFI was revised (known as the FFI-R) on the basis of criticisms from researchers and clinicians. The outcomes instrument, the Foot Function Index Revised (FFI-R), is a theoretical model of foot functioning that has been validated and shown to be a reliable and responsive measure of health-related foot function [21]. The FFI-R has 5 subscales that assess foot health related quality of life in terms of the conceptual components of pain, stiffness, psychosocial stress, difficulty with everyday tasks, and activity limitations. The FFI-R short form was developed to obtain a total foot functioning score, with a greater score indicating a poorer perception of foot function. It is an abbreviated questionnaire allows for pre-procedural and post-procedural comparisons to evaluate the effectiveness of the procedure. We used short form of FFI-R to compare the efficacy within the group and between the groups.

In this study, both the dry needling and corticosteroid groups showed efficacy at the 4 weeks and the efficacy of corticosteroid group was statistically better than in dry needling group at 4 weeks. The anti-inflammatory effects of corticosteroids may be due to a down-regulation of pro-inflammatory cytokines and genes[24]. As inflammation is involved in pain-related mechanisms, corticosteroid injections are useful to reduce pain and, consequently, disability. The possible mechanisms of dry needling for pain reduction are Central release of opioid peptides, increased regional blood flow and anti-inflammatory effects[25]. Due to its direct action in the pain related mechanisms corticosteroid may have better results in short term when compared to dry needling. Similar to our work, Cotchett et al.[26] reported significant plantar heel pain relief in patients who underwent real dry needling compared with counterparts underwent sham dry needling. Crawford et al.[27] in his double blind randomized controlled trial on 106 patients with heel pain at rheumatology clinic concluded that statistically significant reduction in pain was detected at one month ($p=0.02$) in favour of steroid injection of 106 patients comparing steroid injection and an anesthetic control. In our study on follow up of patients from 4th to 12th week, the clinical improvement seen at end of 4th week gradually deteriorated and the loss of efficacy was statistically significant indicating only short term benefit of local steroid injection. In a study, Elisabeth M A Ball et al[28] reported that the benefits of steroid injection over placebo injection at six weeks was maintained until 12 weeks in patients with inferior heel pain. A chochrane systematic review by judy david et al[29] found low quality evidence that local steroid injections compared with placebo or no treatment may slightly reduce heel pain up to one month but not subsequently. A systematic review by Andrew Ang et al[30]on efficacy of corticosteroid concluded that corticosteroid injections are effective in reducing heel pain in patients with plantar fasciitis, including those with chronic pain and those who have failed conservative physical therapies. The effects are usually short term, lasting 4–12 weeks. A study by Shuming Li, et al[31] found treatment with steroid injection showed a significant effect only at the 1-month follow-up but not at 6 or 12 months after treatment. The MSN group achieved more rapid and sustained improvements than the steroid group throughout the duration

In our follow up at 12th weeks when the FFI total score was calculated, it was found that dry needling offers comparable outcomes to corticosteroid injection group. Further follow up of longer duration would have given the better conclusive results on efficacy. However the 12 weeks follow up results are comparable to evidence found in many earlier systematic reviews. A systematic review and meta-analysis by whittaker et al[32] concluded that corticosteroid injection is more effective than some comparators for the reduction of pain and the improvement of function in people with plantar heel pain in short term (0 to 6 weeks), corticosteroid injection is not more effective than placebo injection for reducing pain or improving function in medium term (7 to 12 weeks). In long term corticosteroid injection was less effective than dry needling (13 to 36 weeks). A systematic review of corticosteroid vs dry needling by Sousa Filho et al[33] found Very-low certainty evidence that LSI is superior to DN at shorter follow-up periods, whereas DN seems to be more effective than LSI at longer follow-up durations for improving pain in plantar fasciitis. Our study indicates that dry needling promotes adequate and longer-lasting recovery comparable to corticosteroid injection. Nevertheless, to avoid adverse effects of corticosteroids, dry needling may be a treatment option.

Before making conclusion we have to consider that PF is a self-limiting disease, the effect of improvement of heel pain over time should not be neglected. Plantar fasciitis is a said to be a self-limiting disability in which 90% of patients will improve with conservative therapies, and pain relief is usually achieved within one year regardless of treatment[34]. It can be refractory in some cases. Therefore, dry needling may be considered as an alternative treatment method in refractory cases as it could be repeated multiple times with minimal complication unlike long term side effects of corticosteroids.

Complications:

In this study, the most common adverse effects of dry needling were pain at the needling site (44%) and subcutaneous bleeding (16%). Patients had short term pain (3 to 5days) over injection site. These were managed by ice packs and tab ibuprofen 200 mg BD for 5 days. In 12 weeks of follow up no complications occurred in the corticosteroid group during the trial. Complications representing tendon rupture, nerve injuries, bleeding and infection were not encountered in both groups.

The strengths of this study include its prospective and randomized design. Both local steroid injection and needling procedures were standardised for comparison. Patients follow up with validated and reliable outcome score of FFI-R for plantar fasciitis.

In the limitations of our study, Short- term follow-up of the patients

could be considered as the major limitation as it was not possible to explore the long term benefits and delayed complications. Longer follow-up of the patients or multi-steps evaluation of outcome would further clarify the potential of both treatments in the management of PF. The total sample size 50 patients is smaller sample size for comparing two treatment modalities in most prevalent clinical condition of PF. Still our study will add to strength to further studies with larger study populations. Another limitation that should be considered is that there are different injection techniques and different steroid preparations and dosages; it can be argued that alternative injection methods and different dosages of steroid may produce more benefit.

5.CONCLUSION

Short form of Foot Function Index Revised (FFI-R) is a quick, reliable and patient friendly outcome measurement tool for plantar fasciitis. Both Local Corticosteroid Injection and Dry Needling are effective treatment in refractory cases of Plantar Fasciitis in adjunct to non-invasive conservative treatment modalities. Dry Needling is a safe and reliable procedure for treating refractory cases of Plantar Fasciitis. Even though corticosteroid injection is the most effective treatment for short term symptomatic relief (at 4 weeks), it is found that outcomes of Dry Needling are comparable with the efficacy of corticosteroid injection in the medium term follow-up (12 weeks). Dry Needling has greater physiological compatibility than corticosteroid injection in terms of ability to induce possible healing process in plantar fasciitis and devoid of any long term complication associated with corticosteroid injection.

DECLARATIONS

Funding: None

Conflict of interest: None declared

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