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Comparative study of efficacy of corticosteroid versus analogues platelet rich plasma injection in the management of chronic plantar fasciitis in south Karnataka population

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Abstract
Background: Plantar fasciitis is a common cause of heel pain and is the result of degenerative process of planter fascia at its calcaneal attachment.
Method: Out 50 patients 25 patients were injected corticosteroid 2ml (8 mg) along with 0.5ml of plain 2% xylocaine using 20 G wide bore needle. PRP prepared by blood with drawn from cubital vein with the help of BD vacutainer eclipse in three BD vacutainer tubes which is 2.7 ml tube that contains 0.35 ml of 3.2% of sodium citrate an anticoagulant. Blood was centrifuged twice, first time at 1200/rpm, second time 2400 rpm. The platelets were checked randomly by pathologist by Neubauers chamber or auto analyser. PPP was injected at tenderness site with the after injecting 2% of xylocaine with 20 G. Gauze needle and following for a week, 6th week, 3rd month and 6th months.
Results: Clinical manifestation of base line study – 14 (56%) right heel in PRP group, 15 (60%) in corticosteroid group. In left heel 10 (40%) PRP group, 11 (40%) in corticosteroid group. Base line VAS 7.13 in PRP 7.21 in steroid group, Base line of AOFAS 53 (SD±5.11) in PRP, 54.60 (SD±3.32) in steroid group. Thickness of plantar fascia 5.70 mm in PRP group 5.58 in steroid group. In the comparison of VAS, AOFAS in both groups of PRP and steroids at 6th weeks, 3rd months, 6th months significant ($p<0.001$) results were observed.
Conclusion: It was concluded that corticosteroid is more effective for short duration relief but PRP is more effective for long term relief.
Results: VAS, AOFS, PRP, Corticosteroids Fasciitis, North Karnataka.

Keywords: versus analogues platelet, corticosteroid group, VAS, AOFS, PRP, corticosteroids fasciitis

Introduction

Chronic plantar fasciitis is the most common cause of foot complaints in adults aged between 40 to 60 years with no bias towards either sex [1]. The underlying condition that causes plantar fasciitis is a degenerative tissue condition that occurs near the site of origin of the plantar fascia at the medial tuberosity of the calcaneam [2]. In the acute cases, plantar fasciitis is characterized by classical signs of inflammation including plan swelling and loss of function. For more chronic conditions, however, inflammation is not the underlying tissue disruption. In fact histology of chronic cases has shown no signs of inflammatory cell invasion into the affected area [3]. The tissue instead is characterized histologically by infiltration with macrophages, lymphocytes and plasma cells; tissue destruction; and repair involving immature vascularization and fibrosis. The normal fascia tissue is replaced by an angiofibroblastic hyper plastic tissue which spreads itself throughout the surrounding tissue creating a self-perpetuating cycle of degeneration [4]. Numerous methods have been advocated for treating plantar fasciitis including rest, Non-steroidal antiinflammatory medication and extra corporeal shock wave therapy. Steroid injections are the popular method for treating the condition but only seem to be useful in short term and only to a small degree. Moreover, autologous plate rich plasma injection given for the management of chronic plantar fasciitis. Hence attempt was made to compare the efficacy and duration of treatment in both medications.

Material and Method

50 patients aged between 30 to 55 years visited to orthopaedic department Akash institute of Medical Sciences and research centres were studied.

Inclusive Criteria: The patients diagnosed plantar fasciitis by clinical and radiological evaluation presenting a complaint of planter heel pain more than 6 week (>6 weeks) and plantar fascia thickness was > 4 mm at the area of maximum tenderness (USG of heel for plantar fascia) were selected for study.

Exclusion criteria: Patients with severe anaemia thrombocytopenia, immune compromised, non-cooperative patients were excluded from the study.

Method: Out of 50, 25 patients were given corticosteroid 2 ml (8 mg) and 25 patients PRP. Depomedrol injected along with 0.5ml of plain 2% xylocaine using 20 G wide bore needles into the point

of maximum tenderness. Post injection, patients were asked take rest for 15 minutes and then allowed to walk.

PRP preparation and administration: For the preparation of P – PRP blood was withdrawn from cubital vein with the help of BD vacutainer eclipse in three BD vocutainer tubes which is 2.7ml tube that contains 0.5ml of 3.2% sodium citrate an anticoagulant and volume of approximately 2.35 ml for whole blood. It was prepared using a 2 – spin technique, In the 1st low spin step blood is centrifuged at 1200 rpm for 10 minutes in a Routine 380 R centrifuge model (Hettich, zentrifugen). After the formation of three layers (a bottom layer of RBC, an upper layer composed of plasma, platelets and some WBS an intermediate layer or Buffy coat, composed mostly WBC). The upper layer just above the Buffy coat was collected with a 10 ml syringe; this collection was performed carefully to avoid disturbing the bottom layer of RBC and the Buffy coat layer. Depending upon the centrifugal force of the spin, the collected volume ranged from 0.75 ml to 1.25 ml in each BD vacutainer. Approximately 1 ml of upper layer of the sample that underwent the first spin step was collected and transformed to one empty tube (approximately 3 ml). The tube was centrifuged again for 10 minutes at 2400 rpm. The upper half of the plasma volume platelet poor plasma (PPP), was removed. The remaining volume of PPRP was used for injection. Platelet count was estimated by pathologist. The PRP was randomly checked for number of platelets by Neubauers chamber or auto analyser. Most of the sample had a platelet count more than 1,000.000/µl in 5 ml volume that is 5 times the baseline. After this the PRP is shaken by just turning the tube 2 to 3 times to mix the platelets.

PRP injection technique: Patients was asked to resume supine position the involved foot was cleaned and prepared with spirit and piovodine Iodine. The site of maximum tenderness i.e. medial aspect of the foot at the origin of plantar fascia was marked using marker. One ml of 2% plain xylocaine was in filtered into the skin and subcutaneous tissue. Dry needling, also called peppering, was used to locally "injure" the soft tissue to stimulate the inflammatory response concomitant delivery of the PRP then modulates (enhances) the healing response. Each masking point of tenderness is penetrated with a 20 G-gauge needle until the underlying periosteum is touched. A gristly crunchy texture us audibly and palpably noted as the needle is advanced. After contacting the periosteum, the needle was gently partially with drawn than advanced in fan like wheel (peppering) the area 7 to 10 times. Next, 1 ml of the PRP is injected as this peppering manoeuvre is continued. This process is then carried out at each marked site.

Post-injection care: post injection patients were asked for rest for 15 minutes and then allowed to walk. As PRP effectively induces an inflammatory response, some patients experienced minimal to moderate discomfort following the injection which usually last for up to 1 week. They are instructed to ice the injected area if needed for pain control and modify activity as tolerated. Acetaminophen as the optimal analgesic and NSAIDS were avoided. After 48 hours, patients were given a standardized stretching protocol to follow for 2 weeks. Patients were advised to avoid strenuous activities and rest for 2 weeks. No aggressive running or jumping activities were allowed for 2 weeks. After 4 weeks of the procedure, patients were allowed to proceed with normal sporting or recreational activities as tolerated. Any type of foot orthoses was not allowed.

Each patient was assessed functionally using American orthopaedic; Foot and ankle score (AOFAS), visual analogue scale (VAS) scores and radio-logically by ultrasound thickness of plantar fascia. The AOFS, VAS scores recorded before treatment and a follow up visit at 6 weeks, 3rd month and six month. The duration of study was from February-2020 to January-2021.

Statistical analysis: clinical manifestations comparison VAS, AOFAS, pain severity was studied by using t test and percentage. The statistical analysis was done in SPSS software. The ratio of male and female was 2:1.

Observation and Results

Table 1: Clinical manifestations of patients with chronic plantar fasciitis 14 (56%) right heel, in PRP group, 15 (60%) in corticosteroid group, 10 (40%) in left heel in PRP, 11 (44%) in corticosteroid group.

Baseline VAS score 7.13 in PRP group, 7.21 in corticosteroid group, Baseline AOFS score 53±5.11 in PRP group, 54.60±3.32 in corticosteroid group.

Thickness of plantar fascia 5.70 in PRP group 5.58 in corticosteroid group.

Table 2: Visual Analogue score in both group – Visual scores-pre-treatment 7.13 in corticosteroid group. At 6 Weeks 2.60 in PRP group, 1.92 in corticosteroid group. At 3 months 1.93 in PRP group, 2.88 in corticosteroid group. At 6 months 1.41 in PRP, 3.78 in corticosteroid group.

Table 3: Comparison of pain sensitivity in both groups in mild VAS – 6th week 12 (48%) in steroid group, 20 (80%) in PRP group, in 3rd month 21 (84%) corticosteroid, 9 (36%) in PRP in 6th month, 17 (68%) in PRP and 5 (20%).

In moderate pain VAS – 8 (32%) in steroid, 5 (20%) in PRP at 6th week, 13 (52%) steroid, 4 (16%) in PRP in 3rd month 4 (16%), in steroid 16 (64%). In 6th month 3 (12%) PRP, 19 (76%) steroid, in severe pain VAS-16 (64%) in steroid, 19 (76%) PRP group

Table-4: Comparison of AOFS score in both groups – In pre-treatment 53 (SD±5.11) in PRP, 54.60 (SD±3.32) in corticosteroid group t test 31.8 $p>0.20$ (insignificant). At 6th week 78.2 (SD±2.30) PRP, 85.05 (SD±2.60) in steroid t test -8.4 $p<0.001$ (p value highly significant), At 3rd month 84.70 (SD±2.30) in PRP, 77.5 (SD±3.61) in steroid t test 12.003 $p<0.00$ (p value highly significant), At 6th months 89.02(SD±3.30) in PRP, 73.6 (SD±3.61) in steroid, t test 15.7 $p<0.001$ (p value highly significant)

Discussion

Present comparative study, the efficacy of corticosteroid versus PRP in the management of chronic plantar Fasciitis, in south Karnataka Population. The clinical manifestations were In right heel, 14 (56%) PRP group, 15 (60%) steroid group, In left heel 10 (40%) PRP group, 11 (44%) steroid group, VAS Baseline 7.13 in PRP, 7.21 in steroid, AOFAS Baseline, 53 (SD±5.11) in PRP, 54.6 (SD±3.32) in steroid. Thickness of fascia 5.70 in PRP and 5.58 in steroid group (Table-1).

In visual Analogue score in both groups 6 weeks, 2.60 in PRP, 7.21 in corticosteroid. At 3rd month 1.93 in PRP, 2.88 in steroid, at the 6th months 1.41 in PRP, 3.78 in steroid group (Table-2).
Comparison of pain sensitivity of both groups, in mild pain VAS at 6th month, 12 (48%) steroid, 20 (80%) PRP, 3rd month 21 (84%) steroid, 9 (36%) PRP at 6th month, 4 (16%) PRP, In moderate pain – Pre-treatment 8 (32%) steroid, 5 (20%) PRP, At 6th week 13 (52%) steroid, 4 (16%) PRP, at 3rd month 4 (16%) steroid, 16 (64%) PRP, at 6th month 17 (68%) PRP, 5 (20%) steroid severe pain-pre-treatment 16 (97%) steroid 19 (76%) PRP, then 0% at 6th week 3rd month, 6th month (Table-3) in the comparison of AOFS score in both groups At 6th weeks 78.2 (SD±2.30) in PRP 85.05 (SD±2.60 in steroid group, t test -8.4 ($p<0.001$) p value is highly significant. At 3rd month 84.7 (SD±2.30) in PRP, 77.5 (SD±1.90) t test 12.03 ($p<0.00$) p value is highly significant, At 6th month 89.02 (SD±3.30) PRP, 73.6 (SD±3.61) t test 15.7 ($p<0.001$) p value is highly significant (Table-4). These finding are more or less in agreement with previous studies [5, 6, 7].
Plantar fasciitis is considered an overuse injury and such patient's history will typically reveal some combination of either intrinsic or extrinsic factors that contribute to the development of the injury. Extrinsic factors are due to unyielding surface on exercise (movement) and improper and excessively worn foot wear [8]. Intrinsic factors include obesity, foot structure, reduced plantar flexion strength and reduced flexibility of the plantar flexor muscles and tensional mal alignment of the lower extremity (9). The most often cause of plantar fasciitis is excessive pronation (inversion) of foot. Increased tension placed arch lowering during standing and walking. The non-surgical management for the treatment of the symptoms and discomfort associated with plantar fasciitis are (1) reducing pain and inflammation (2) reducing stress to tolerate level (3) restoring muscle strength and flexibility involved tissue. Corticosteroid local injection gives sudden relief for pain and inflammation but to reducing stress, to tolerate and restoring muscle strength PRP proved to be efficient because enables cell proliferation, angiogenesis and cell migration are stimulated resulting in tissue regeneration. Platelets secrete anti-microbial peptides, suggesting an antibiotic effect [10]. Moreover PRP has anti-inflammatory and analgesic effects also. It is also reported that PRP is superior to hyaluronic acid, visco supplementation because PRP is a biological product [11]. Hence PRP is a multi-potential application in orthopaedics sport medicine and repetitive surgery. While corticosteroid has many side effects on prolong usage like osteoporosis, loss of immunity even addiction to steroids is also recorded.

Summary and Conclusion

In the present comparative study of PRP and corticosteroids in the management of chronic fasciitis confirmed that PRP injection is an efficient and safe therapeutic option for the treatment of chronic plantar fasciitis but long duration treatment has to be the protocol to get satisfactory result. But this study demands further histo-pathological, nutritional, genetic, musculo-skeletal study. Because despite many contributing factors, none of these factors have proven to be predictive of clinical outcome, plantar fasciitis occurs at any age in both sexes and in many occupations.

- The research paper was approved by ethical committee of Akash institute of Medical Sciences and research centre Devanhalli Bangalore-562110. Karnataka.
- No Conflict of Interest
- No Funding

Table 1: (No. of patients: 50) Clinical Manifestations of patients with chronic plantar fasciitis

Sl No	Manifestations	PRP group 25	Corticosteroid 25 group
1	Right heel	14 (56%)	15 (60%)
2	Left heel	10 (40%)	11 (44%)
3	Vase line VAS score	7.135	7.212
4	Base line AOFAS	53±5.116	54.60±3.32
5	Thickness of plantar fascia	5.70	5.58

AOFS = American orthopaedic Foot and ankle score, PRP = Platelet rich plasma, VAS = visual analogue scale

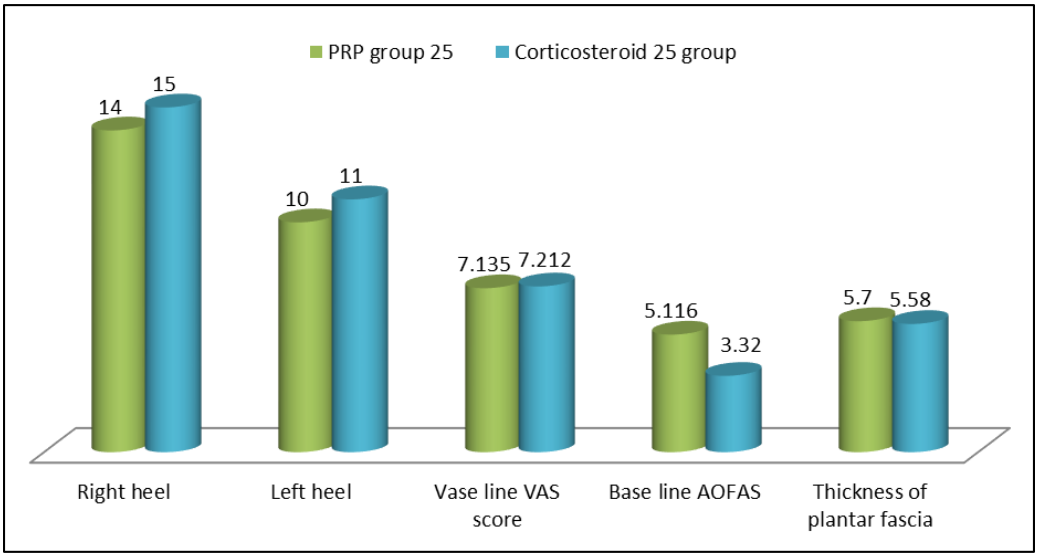

Fig 1: Clinical Manifestations of patients with chronic plantar fasciitis

Table 2: Visual Analogue score in both groups

Visual score	PRP group (25)	Corticosteroid Group (25)
Pre treatment	7.135	7.212
6 Weeks	2.60	1.926
3 months	1.930	2.88
6 months	1.411	3.784

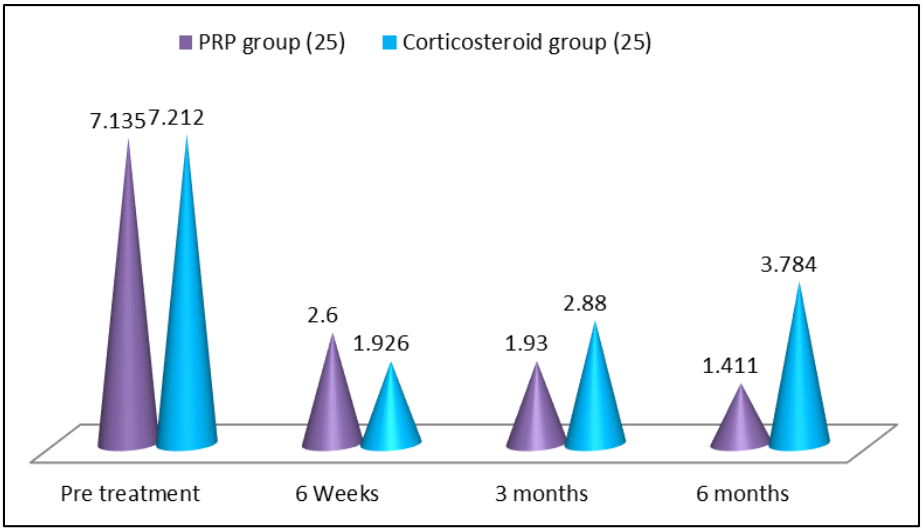

Fig 2: Visual Analogue score in both groups

Table 3: Comparison of pain severity in both groups

VAS	Pre treatment		6th week		3rd month		6th month	
No pain VAS-0	Steroid (%)	PRP (%)	Steroid (%)	PRP (%)	Steroid (%)	PRP (%)	PRP	Steroid
	0	0	0	0	0	0	4 (16%)	0
Mild pain VAS 1, 2 3	0	0	12 (48%)	20 (80%)	21 (84%)	9 (36%)	17 (68%)	5 (20%)
Moderate pain VAS 4, 5 6	8 (32%)	5 (20%)	13 (52%)	4 (16%)	4 (16%)	16 (64%)	3 (12%)	19 (76%)
Severe pain VAS- 7 8, 9	16 (64%)	19 (76%)	0	0	0	0	0	0
Worst pain VAS – 10	0	0	0	0	0	0	0	0

PRP = Platelet Rich Plasma, VAS = Visual Analogue Scale

Table 4: Comparison of AOFAS score in both groups

AOFAS score	PRP Group	Corticosteroid group	t test	p value
Pre-treatment	53 (SD±5.116)	54.60 (SD±3.32)	31.8	p>0.20
6 Weeks	78.2 (SD±2.30)	85.05 (SD±2.60)	-8.4	P<0.001
3 Months	84.70 (SD±2.30)	77.52 (SD±1.90)	12.03	P<000
6 Months	89.02 (SD±3.30)	73.65 (SD±3.61)	15.7	P<0.01

AOFAS = American Orthopaedic Foot and Ankle Society Score PRP = Platelets Rich Plasma

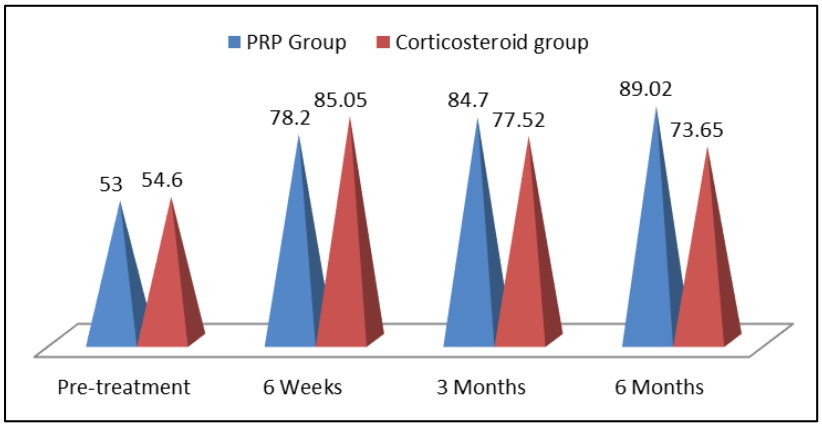

Fig 3: Comparison of AOFAS score in both groups

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