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ORIGINAL ARTICLE

Effectiveness of Corticosteroid Injections in Reducing the Intensity of Pain in Patients with Plantar Fasciitis

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ABSTRACT

Objective: To evaluate the effectiveness of corticosteroid injections in reducing the intensity of pain in patients with plantar fasciitis and assess its long-term outcomes.

Methods: A prospective study was conducted on 72 patients diagnosed with plantar fasciitis, treated with corticosteroid injections. Pain intensity was assessed using the Visual Analog Scale (VAS) before treatment, at 1 week, 1 month, and 3 months post-injection. Statistical analyses included paired t-tests for pain reduction comparisons and logistic regression to analyze predictive factors for pain relief.

Results: Pain intensity significantly reduced post-injection, with a mean VAS score decrease from 8.2 ± 1.0 pre-treatment to 4.5 ± 1.3 at 1 month ($p < 0.001$). However, the effect diminished after 3 months (VAS = 6.3 ± 1.2, $p < 0.01$). Logistic regression showed that the pre-treatment VAS score and age were significant predictors of pain reduction ($p < 0.05$).

Conclusion: Corticosteroid injections provide significant short-term pain relief in patients with plantar fasciitis, but long-term efficacy remains uncertain. Factors such as age and baseline pain intensity may influence outcomes.

Keywords: Plantar fasciitis, corticosteroid injection, pain reduction, Visual Analog Scale, long-term outcomes

INTRODUCTION

Plantar fasciitis is a common musculoskeletal condition characterized by heel pain, which is primarily caused by inflammation of the plantar fascia. It is one of the leading causes of foot pain and affects approximately 10% of the general population over their lifetime, with a peak incidence between the ages of 40 and 60 years[1,2]. The condition is typically associated with risk factors such as obesity, prolonged standing, or excessive physical activity, especially running or high-impact sports[3,4]. Additionally, improper footwear and limited ankle dorsiflexion can also exacerbate the condition[5].

Traditional conservative treatments include rest, physical therapy, and the use of orthotic devices[6,7]. However, for patients with persistent symptoms despite these measures, corticosteroid injections have been widely used as an alternative to reduce pain and inflammation[8]. Corticosteroid injections are thought to provide rapid relief by targeting the inflammatory response in the affected tissue[9]. While they offer quick pain relief, there is ongoing debate regarding their long-term efficacy and potential adverse effects, including tissue damage and recurrence of pain[10].

Although several studies have shown that corticosteroid injections can lead to short-term improvement in pain levels, the long-term benefit is less clear[11,12]. It is also essential to understand which factors influence the response to treatment, including baseline pain intensity and patient demographics, to predict better outcomes[13]. This study aims to evaluate the effectiveness of corticosteroid injections in reducing pain intensity in patients with plantar fasciitis and to explore the factors that influence the success of this treatment.

MATERIALS AND METHODS

Study Design and Participants: This was a prospective multicenter cohort study conducted at DHQ teaching hospital Timergara/ Ali Fatima Hospital Lahore during from May 2023 to October 2023. Seventy-two patients diagnosed with plantar fasciitis were included in the study, all of whom received a single corticosteroid injection. The diagnosis was based on clinical examination and ultrasound findings of plantar fascia thickening.

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Inclusion Criteria:

- Age 18–65 years
- Chronic heel pain for at least 6 weeks
- No response to conservative treatments (e.g., stretching exercises, NSAIDs)

Exclusion Criteria:

- Pregnancy
- Previous history of corticosteroid injection in the past 6 months
- Comorbidities such as diabetes or rheumatoid arthritis

Intervention: All patients received a corticosteroid injection consisting of 40 mg of triamcinolone acetonide mixed with 2 ml of local anesthetic (lidocaine). The injection was administered under sterile conditions by a trained physician, targeting the site of maximum tenderness in the plantar fascia.

Outcome Measures: Pain intensity was assessed using the Visual Analog Scale (VAS) at four time points:

1. Pre-treatment (baseline)
2. 1 week post-injection
3. 1 month post-injection
4. 3 months post-injection

Statistical Analysis: Descriptive statistics were used to summarize patient demographics and baseline characteristics. Paired t-tests were employed to compare VAS scores between baseline and subsequent follow-up visits. Logistic regression was used to identify factors predictive of significant pain reduction (defined as a VAS decrease of 50% or more). A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: The study was approved by the institutional review board, and informed consent was obtained from all participants.

RESULTS

A total of 72 patients (41 women and 31 men) participated in the study. The mean age of the participants was 48.2 ± 10.5 years (range 18–65 years). The average body mass index (BMI) was 28.4 ± 4.1 kg/m², indicating that most participants had a BMI in the overweight range. The duration of plantar fasciitis symptoms prior to treatment ranged from 6 weeks to 24 months, with a mean of 8.4 ± 3.6 months.

The demographic characteristics of the participants are summarized in Table 1 below. The majority of patients were

employed, with 25% working in manual labor occupations, 40% in office-based jobs, and 35% in healthcare and service professions. 50% of patients reported a history of physical activity, including running and recreational sports, which might have contributed to the onset of their symptoms. The remaining patients were either sedentary or engaged in light physical activity. Table 1

Table 1: Demographics of all the included patients

Demographic Characteristic	Value
Total Number of Participants	72
Gender (n, %)	
- Male	31 (43%)
- Female	41 (57%)
Mean Age (years)	48.2 ± 10.5
Age Range (years)	18–65
Mean BMI (kg/m²)	28.4 ± 4.1
BMI Categories (n, %)	
- Underweight (<18.5)	2 (2.8%)
- Normal weight (18.5–24.9)	20 (27.8%)
- Overweight (25–29.9)	34 (47.2%)
- Obesity (≥30)	16 (22.2%)
Occupation (n, %)	
- Manual labor	18 (25%)
- Office-based	29 (40%)
- Healthcare/Service	25 (35%)
Physical Activity History (n, %)	
- Active (running, sports)	36 (50%)
- Sedentary or light activity	36 (50%)
Duration of Symptoms (months)	8.4 ± 3.6
Symptoms Duration Range	6 weeks to 24 months

The primary outcome of the study was pain reduction, measured using the Visual Analog Scale (VAS) at four time points: pre-treatment (baseline), 1 week, 1 month, and 3 months post-injection. VAS scores ranged from 0 (no pain) to 10 (worst pain imaginable).

Pain intensity was significantly reduced at all follow-up points post-injection. At baseline, the average VAS score was 8.2 ± 1.0. At 1 week post-injection, the mean VAS score decreased to 5.1 ± 1.2, which was a statistically significant reduction ($p < 0.001$). A continued reduction was observed at 1 month with a mean VAS of 4.5 ± 1.3 ($p < 0.001$), but the effect began to fade by 3 months, where the mean VAS score increased to 6.3 ± 1.2 ($p < 0.01$), although it remained lower than the baseline. (Table 2)

Table 2: VAS Scores Pre- and Post-Treatment

Time Point	Mean VAS ± SD	p-value
Pre-treatment (baseline)	8.2 ± 1.0	-
1 week post-injection	5.1 ± 1.2	< 0.001
1 month post-injection	4.5 ± 1.3	< 0.001
3 months post-injection	6.3 ± 1.2	< 0.01

As shown in the table, there was a consistent and significant reduction in pain during the first month following corticosteroid injection, but the relief was less sustained at 3 months, indicating the potential transient nature of the effects.

Logistic Regression Analysis: A logistic regression model was constructed to identify predictive factors for significant pain relief (defined as a VAS decrease of ≥50%). Age and baseline pain intensity (pre-treatment VAS score) were found to be significant predictors of pain reduction ($p < 0.05$). Table 2 summarizes the results of the logistic regression analysis. (Table 3)

Table 3: Logistic Regression for Predicting Pain Relief

Predictor	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Baseline VAS Score	1.73	1.21–2.48	0.002
Age	1.05	1.01–1.10	0.028

The odds ratio for baseline VAS score suggests that higher pain levels at baseline significantly increase the likelihood of a substantial reduction in pain post-injection. Similarly, older age was associated with a greater chance of experiencing significant pain relief.

DISCUSSION

Our findings confirm that corticosteroid injections are effective in providing significant short-term pain relief in patients with plantar fasciitis, as evidenced by the substantial reduction in VAS scores at 1 week and 1 month post-injection. These results are consistent with previous studies that have demonstrated the short-term efficacy of corticosteroid injections in alleviating pain in plantar fasciitis patients[14,15]. Our data suggest that corticosteroid injections can significantly reduce pain intensity in the initial months following the treatment, with the greatest reduction observed at 1 month.

However, as noted in our study, the effectiveness of corticosteroid injections begins to diminish after 3 months, with a slight increase in pain at this follow-up point. This finding is in line with several other studies that have reported a similar decline in the effectiveness of corticosteroid injections over time[16,17]. The transient nature of the pain relief could be due to the temporary reduction in inflammation that corticosteroids provide. However, the mechanisms of the condition—such as repetitive stress on the plantar fascia—can lead to the reappearance of symptoms after the corticosteroid's anti-inflammatory effect wanes[18].

Additionally, our logistic regression analysis identified baseline pain intensity and age as significant predictors of pain relief. These findings are consistent with studies that suggest patients with higher baseline pain levels may experience more significant pain reduction following corticosteroid injections[19,20]. Interestingly, age was also a predictor of better outcomes, which may be attributed to age-related changes in tissue structure or other age-related factors, such as tissue healing capabilities[21]. This supports the idea that treatment success is not only dependent on the severity of the condition but also on patient-specific factors[22].

The risks of repeated corticosteroid injections remain a concern. Several studies have highlighted the potential for tissue damage, including fat pad atrophy and plantar fascia rupture, with frequent injections[23,24]. As such, corticosteroid injections should be considered part of a broader treatment strategy, ideally combined with physical therapy, stretching exercises, and orthotic support to manage plantar fasciitis effectively[25]. Future research with longer follow-up periods and larger sample sizes would provide better insights into the durability of corticosteroid injections and how best to integrate them into long-term management strategies.

CONCLUSION

In conclusion, corticosteroid injections are effective in providing short-term relief for pain associated with plantar fasciitis. The injections significantly reduce pain intensity in the first month following treatment, but the effects tend to diminish after 3 months. Baseline pain intensity and age were found to be key predictors of a positive response to treatment. However, due to the temporary nature of relief and potential side effects, repeated use of corticosteroid injections should be approached with caution. As part of a comprehensive treatment strategy that includes physical therapy and other conservative interventions, corticosteroid injections can be an important tool in the management of plantar fasciitis, particularly for patients requiring immediate pain relief.

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