

Original Research Article

Association of calcaneal spur in patients with plantar fasciitis

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ABSTRACT

Background: A benign and self-limiting condition, degeneration at the root of the plantar fascia at the medial calcaneal tuberosity of the heel is the etiology of plantar fasciitis. Calcaneal spurs are tiny, fibro-cartilaginous triangular projections. These are found in the calcaneum and can be of varied sizes. However, the degree of coexistence of the two conditions has not been established and the evidence is quite low. Knowing these associations would provide valuable insights and aid in better management protocols.

Methods: The study included 131 patients who were diagnosed with plantar fasciitis and a control group of 131 cases (who underwent heel x-ray and assessments for some other reason). The history and physical examination were the main factors used to diagnose plantar fasciitis. To check for the existence of calcaneal spurs and other heel pathologies in both groups, X-rays were taken.

Results: All patients suffered from heel tenderness and stretch pain in the plantar fasciitis group. The 84 cases (64.12%) in the plantar fasciitis group and 25 cases (19.08%) in the control group were noted to have calcaneal spurs. The difference in the incidence of calcaneal spur was found to be statistically significant ($p < 0.05$). The mean age was noted to be significantly higher in the subgroup of calcaneal spur cases, in the plantar fasciitis group ($p < 0.05$).

Conclusions: The incidence of calcaneal spur was noted to be significantly higher with plantar fasciitis versus control group, indicating an association between the two conditions.

Keywords: Plantar fasciitis, Calcaneal spur, Stretch pain, Heel tenderness

INTRODUCTION

Plantar fasciitis is a self-limiting condition arising from the degeneration of plantar fascia origin at the medial calcaneal tuberosity. The involvement of adjacent perifascial structures is noticed in this condition. Plantar fascia is a vital structure involved in the normal biomechanics of the foot, offering the support for the arch of the foot, and acting like a shock absorber. It presents in adults with sharp pain over the heel which is localized. The disease result from repetitive strain leading to micro-tears of the plantar fascia. It is believed that in about 10% of the general population, plantar fasciitis occurs at least once in their life. Out of the 10% population, 83% were employed

individuals between the ages of 25 and 65 years. Some important risk factors depending on the foot type are pes planus, pes cavus, restricted ankle dorsiflexion, and extreme pronation or supination. The condition is also associated with tight gastrocnemius, soleus, and/or other posterior leg muscles. The other most observed condition is the calcaneal spur, however the spurs themselves are not the cause. The pain is maximum early hours of the day, exaggerated during the first few steps and the later relieved.¹

Calcaneal spurs are small triangular projections which are fibro-cartilaginous in nature. These are found in calcaneum and can be of varied size. According to their

location, dorsal calcaneal spur and plantar calcaneal spur exist.²

Etiology

Inflammation of the plantar fascia caused by chronic traction of fascia. Finally, ossification produces enthesitis. Due to the repeated pressure on plantar fascia, calcaneal stress fractures are observed. Calcaneal spurs arise as a protective mechanism. As weight and age cause the heel pad's thickness to gradually increase, there is a drastic reduction in the plantar fascia elasticity. This might give rise to the calcaneal spur.³

The German physician Plettner initially described calcaneal spur in 1900, and coined the term "Kalkaneussporn." (calcaneal spur).⁴ However, the degree of coexistence of the two conditions has not been established and the evidence is quite low. Knowing these associations would provide valuable insights and aid in better management protocols.

The study aims to association of calcaneal spur in patients with plantar fasciitis. This study will help add crucial evidence with respect to this topic and give a better and clearer idea about the technique.

METHODS

Study site

Study conducted at department of orthopaedics, all India institute of medical sciences, Raipur.

Sample population

The study population were patients of all ages, gender suffering from plantar fasciitis (case group).

Sample size

Based on the incidence of plantar fasciitis in the hospital, the sample size was noted to be 131 for the group. An equal number of control group cases (undergoing X-ray: lateral ankle with complaints other than plantar fasciitis). were also enrolled.

Design of study

It was a cross-sectional study.

Duration of study

Data was collected between January 2021 to October 2022. The analysis of the parameters was done after data was collated completely. At any point of time, the patient may opt out of the study. Only after receiving approval from the institutional ethics committee; the study was initiated.

Inclusion criteria

All patients suffering from plantar fasciitis (case group), patients of either gender irrespective of their age. Patients who are willing to give written and informed consent for this study were included.

Exclusion criteria

Patients who presented at the department of orthopaedics complaining of conditions other than plantar fasciitis. Patients not willing to give consent, psychiatric patients, non-cooperative patients, previous history of surgery or fractures of the ankle or heel and presence of inflammatory joint disease were excluded.

Parameters assessed

The following were the several research factors that were noted: Information on age, gender, height, body weight, and body mass index (BMI) Socio-economic status. The side of the affected lesion, pain duration, pain perception on palpation estimated using a visual analogue scale (VAS), presence of swelling and calcaneal spur: X-ray calcaneum lateral view.

Statistical analysis

After collecting the relevant data, it was entered in Excel. The data was examined using the statistical program Graphpad InStat v3.0. To display quantitative data, mean and standard deviation were used. Frequency and percentages were used to express the qualitative data. To analyse quantitative data that was not regularly distributed, the Mann-Whitney U test was used, while the t-test was used for normally distributed data. The Fischer's exact test or the chi-square test was used to compare the qualitative data between groups. It was statistically significant if the p was less than 0.05.

Brief methodology

After institutional ethics committee approval, a prospective cross-sectional study was carried out. The study was conducted on 131 patients who were diagnosed with plantar fasciitis, and a control group of 131 cases (who underwent heel x-rays and assessment for some other reason). The primary goal of the study was to examine associations between plantar calcaneal spurs and plantar fasciitis. The data was collected prospectively from patients who were diagnosed with plantar fasciitis between January 2021 to October 2022. The history and physical examination were the primary methods used to diagnose plantar fasciitis. Patients who had presented with characteristic heel pain with their first step in the morning or after prolonged sitting, or tenderness at medial plantar calcaneal region. All the controls were selected with complaints other than plantar fasciitis. X-rays were done to look for the presence of calcaneal spur and other heel pathology in both groups. Afterward, we gathered data on

the patient's height, weight, socioeconomic status, and demographics.

RESULTS

Calcaneal spur status in study groups

The 84 cases (64.12%) in plantar fasciitis group and 25 cases (19.08%) in the control group were noted to have a calcaneal spur. The difference in the incidence of calcaneal spur was found to be statistically significant (p<0.05).

Table 1: Calcaneal spur status in study groups.

Calcaneal spur present?	Plantar fasciitis group, (n=131) (%)	Control group, (n=131) (%)
Yes	84 (64.12)	25 (19.08)
No	47 (35.88)	106 (80.92)
P value	0.001*	

*Considered significant by Chi-square test

Demographic details of enrolled cases in the study groups

The 262 patients were enrolled in the study, 131 in the group of plantar fasciitis cases, and 131 in control group. Both, gender distribution and the mean age were found to be statistically comparable amongst the groups (p>0.05). Women made up the majority of cases in both research groups (Table 1).

Majority of cases in plantar fasciitis group belonged to 41-50 years' age group (43.51%), followed by 51-60 years' age group (21.37%). Majority of cases in control group belonged to 51-60 years' age group (28.24%), followed by 41-50 years' age group (26.72%) (Table 2).

Table 2: Demographic details in study groups.

Parameter assessed	Plantar fasciitis group, (n=131) (%)	Control group, (n=131) (%)	P value
Mean age (in years)	46.8±10.53	48.89±12.22	0.23
Median age (in years)	46	47	-
Minimum age (in years)	26	23	-
Maximum age (in years)	76	79	-
Number of males	53 (40.46)	61 (46.56)	0.38
Number of females	78 (59.54)	70 (53.44)	

Table 3: Age distribution in study groups.

Age group (in years)	Plantar fasciitis group, (n=131) (%)	Control group, (n=131) (%)
≤30	9 (6.87)	7 (5.34)
31-40	25 (19.08)	30 (22.9)
41-50	57 (43.51)	35 (26.72)
51-60	28 (21.37)	37 (28.24)
61-70	10 (7.63)	18 (13.74)
>70	2 (1.53)	4 (3.05)

Anthropometric details in study groups

The mean weight and the mean height were noted to be statistically comparable between the two study groups (p>0.05).

Table 4: Anthropometric details in study groups.

Parameter assessed	Plantar fasciitis group, (n=131)	Control group, (n=131)	P value
Weight details			
Mean weight (kg)	66.12±10.11	66.31±9.24	0.48
Median weight (kg)	66	66.5	-
Minimum weight (kg)	34	36	-
Maximum weight (kg)	90	91	-
Height details			
Mean height (cm)	163.32±3.56	164.31±3.86	0.54
Median height (cm)	164	164.5	-
Minimum height (cm)	156	157	-
Maximum height (cm)	170	169	-

Socioeconomic status in study groups

Most of the cases in plantar fasciitis group (39.69%) and control group (41.98%), belonged to lower middle socioeconomic class, followed by upper-lower class in both groups (Table 5).

Table 5: Socioeconomic status in study groups.

Socioeconomic status	Plantar fasciitis group, (n=131) (%)	Control group, (n=131) (%)
Upper lower	49 (37.4)	48 (36.64)
Upper middle	30 (22.9)	28 (21.37)
Lower middle	52 (39.69)	41 (98)

Pain VAS score in plantar fasciitis group

The mean VAS score for pain in plantar fasciitis group was noted to be 4.54±1.40, with a median value noted to be 5 (range: 2 to 7).

Majority of cases in the study group had VAS score between 4-6 (64.12%), followed by ≤3 (27.48%), and ≥7 (8.4%). None of the patients in control group reported any heel pain.

Table 6: Pain VAS score status in plantar fasciitis group, (n=131).

VAS score	N	Percentage (%)
≤3	36	27.48
4-6	84	64.12
≥7	11	8.4

Tenderness status in plantar fasciitis group

All patients in the plantar fasciitis group suffered from tenderness. None of the patients in control group suffered from any tenderness (Table 7).

Table 7: Tenderness status in plantar fasciitis group (n=131).

Tenderness present?	N	Percentage (%)
Yes	131	100
No	0	0

Stretch pain status in plantar fasciitis group

All patients in plantar fasciitis group suffered from stretch pain. None of the patients in control group suffered from stretch pain (Table 8).

Table 8: Stretch pain status in plantar fasciitis group, (n=131).

Stretch pain present?	N	Percentage (%)
Yes	131	100
No	0	0

Comparison of patient factors between subgroup of patients with and without calcaneal spur in plantar fasciitis group

The mean age was noted to be significantly higher in the subgroup of calcaneal spur cases, in the plantar fasciitis group (p<0.05)

The gender distribution, anthropometric assessments and the socioeconomic class distribution was statistically comparable between calcaneal spur and non-spur subgroups (p>0.05) (Table 9).

Table 9: Comparison of patient factors between subgroup of patients with and without calcaneal spur in plantar fasciitis group.

Characteristic	Calcaneal spur present, (n=84)	Calcaneal spur absent, (n=47)	P value
Mean age (in years)	48.62±9.74	43.55±11.18	0.03
Gender distribution			
Males	34	19	0.99
Females	50	28	
Anthropometric details			
Mean weight (kg)	66.55±9.34	65.36±11.43	0.43
Mean height (cm)	163.31±3.61	163.34±3.42	0.59
Socioeconomic status			
Upper lower	30	19	0.72
Upper middle	20	10	0.9
Lower middle	34	18	0.95

DISCUSSION

One percent of all referrals to orthopaedic surgeons are for heel pain, with plantar fasciitis being the most prevalent cause.⁵ Plantar fasciitis most likely has a complex underlying etiology. A surgical excision of the plantar calcaneal spur may be considered by certain doctors who believe that the spur is the source of plantar fasciitis symptoms. From a therapeutic perspective, there are differences between the two pathologies. Overuse or ligament injury are the main causes of plantar fasciitis, which results in stiffness and irritation. Trauma or bruises to the heel bone is the most common cause of heel spurs, which results in a calcium deposition that extends beyond the edge of the bone. Patients typically have a combination of plantar fascia tendinopathy, enlarged calcaneus bone, and severe calcification.^{6,7}

Demographic details in study

The mean age, gender distribution, weight and height were noted to be statistically comparable between groups (p>0.05). Majority of cases in both study groups were females (59.54% in case group and 53.44% in control group). Most of the cases in plantar fasciitis group (39.69%) and control group (41.98%) belonged to lower middle socioeconomic class. Mean VAS score for pain in plantar fasciitis group was noted to be 4.54±1.40, with a median value noted to be 5 (range: 2 to 7). Majority of cases in the study group had VAS score between 4-6 (64.12%), followed by <3 (27.48%), and >7 (8.4%). All patients in the plantar fasciitis group suffered from tenderness and stretch pain. 84 cases (64.12%) in plantar fasciitis group and 25 cases (19.08%) in control group were noted to have calcaneal spur. The difference in incidence of calcaneal spur was found to be statistically significant (p<0.05). The mean age was noted to be

significantly higher in the subgroup of calcaneal spur cases, in the plantar fasciitis group ($p < 0.05$). The gender distribution, anthropometric assessments and the socioeconomic class distribution was statistically comparable between calcaneal spur and non-spur subgroups ($p > 0.05$). The mean VAS score was noted to be significantly higher in the subgroup of calcaneal spur cases versus non-calcaneal spur subgroup, in the plantar fasciitis group.

Calcaneal spur status in enrolled patients

84 cases (64.12%) in plantar fasciitis group and 25 cases (19.08%) in control group were noted to have calcaneal spur. The difference in incidence of calcaneal spur was found to be statistically significant ($p < 0.05$). This clearly shows that the plantar fasciitis group of patients were significantly associated with presence of calcaneal spur.

Table 6.2 below gives the incidence of calcaneal spurs with plantar fasciitis cases in similar studies. The concurrent incidence of calcaneal spur and plantar fasciitis ranged from 20.4% to 89%. The study by Lourdes et al included patients with heel pain, but since the most common cause of heel pain is plantar fasciitis, we have considered the Lourdes et al. study as well.¹²

Limitations

This study deals about the association of calcaneal spur in patients with plantar fasciitis. This study does not comment on the further treatment protocol of the patients who are diagnosed with plantar fasciitis. The second limitation is small size population, which makes the result inaccurate to generalize to whole population.

CONCLUSION

The incidence of calcaneal spur was noted to be significantly higher with plantar fasciitis versus control group, indicating an association between the two conditions. Higher age and greater pain were related with calcaneal spur occurrence in patients with plantar fasciitis. Future studies with multicentre study design as well as high sample size can help in validating our study findings.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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