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**“EVALUATE THE DIVERGENCE BETWEEN PLANTAR FASCIITIS  
AND ACHILLES TENDONITIS CASES ADMITTED IN  
ORTHOPAEDIC UNIT AT TERTIARY CARE HOSPITAL,  
BELAGAVI”**

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## ABSTRACT

**Background:** The plantar fascia, which is one of the major arch-supporting structures of the human foot, sustains high tensions during weight-bearing. A positive correlation between Achilles tendon loading and plantar fascia tension has been reported. Excessive stretching and tightness of the Achilles tendon are thought to be the risk factors of plantar fasciitis but their biomechanical effects on the plantar fascia have not been fully addressed. The study was conducted to evaluate the divergence between plantar fasciitis and Achilles tendonitis cases admitted in orthopaedic unit at tertiary care hospital, Belagavi”.

**Objectives:** To determine the divergence between plantar fasciitis and Achilles tendonitis cases admitted in orthopaedic unit, and to determine the association between plantar fasciitis and Achilles tendonitis with selected demographic variables.

**Design:** Descriptive research approach.

**Method:** Quantitative method was adopted.

**Results:** There will be significant association between plantar fasciitis and Achilles tendonitis with selected demographic variables. Hence null hypothesis was rejected and alternate hypothesis was accepted.

**Conclusion:** At the end of research the conclusion given as plantar fasciitis and Achilles tendonitis both the conditions are interrelated with each other

**KEYWORDS:** Divergence, planter fasciitis, Achilles tendonitis, orthopaedic unit, and tertiary care hospital.

## INTRODUCTION

Achilles tendinitis and plantar fasciitis are common causes of heel pain, affecting different anatomical structures around the heel. Achilles tendinitis involves inflammation of the Achilles tendon at its attachment to the back of the calcaneus, whereas plantar fasciitis is characterized by inflammation of the plantar fascia where it attaches to the underside of the heel bone. Individuals with either condition typically report sharp heel pain during the first few steps after waking in the morning or after standing up following prolonged sitting. Radiographic examination may reveal calcific deposits at the tendon or fascia insertion sites. When calcification is specifically identified at the insertion of the Achilles tendon, the condition is more accurately diagnosed as calcific Achilles tendinitis, indicating the presence of calcium deposits within the tendon in addition to inflammation.<sup>1</sup>

Plantar fasciitis is an inflammatory condition affecting the plantar fascia, a thick, fibrous band of connective tissue that extends from the calcaneus (heel bone) to the toes. The plantar fascia plays a vital role in supporting the longitudinal arch of the foot and absorbing shock during standing, walking, and running. Plantar fasciitis develops when the plantar fascia is subjected to repetitive stress, overuse, or excessive stretching, leading to microscopic tears and inflammation. It is the most common cause of heel pain, typically presenting as sharp pain at the bottom of the heel, especially during the first few steps in the morning or after prolonged periods of rest. Although the condition most commonly affects one foot, it can occasionally involve both feet simultaneously.<sup>2</sup>

Plantar fasciitis and Achilles enthesopathy are among the most common causes of heel pain, affecting the plantar and posterior aspects of the heel, respectively. In most patients, these conditions respond well to conservative management, including rest, physiotherapy, stretching exercises, orthotic support, and anti-inflammatory medications. However, surgical intervention may be considered for patients with persistent symptoms that do not improve despite adequate nonsurgical treatment. Several surgical techniques have been described for both conditions. For plantar fasciitis, endoscopic plantar fascia release has been associated with a faster postoperative recovery than the traditional open procedure, although both

techniques provide comparable long-term outcomes. In Achilles enthesopathy, surgery typically involves debridement of the inflamed retro calcaneal bursa, excision of calcaneal osteophytes, and removal of degenerated tendon tissue. When more than 50% of the Achilles tendon is excised, tendon reconstruction or augmentation using suture anchors, tendon transfer, or allograft may be required to restore tendon strength and function.<sup>3</sup>

Plantar fasciitis is one of the most common causes of heel pain, particularly among middle-aged adults. It is characterized by inflammation and degenerative changes of the plantar fascia resulting from repetitive micro trauma at its insertion on the calcaneus. The condition has a multifactorial aetiology, with contributing factors including biomechanical abnormalities, anatomical variations, excessive mechanical loading, obesity, prolonged standing, and repetitive overuse. Recent research has highlighted the close structural and functional relationship between the plantar fascia and the Achilles tendon, suggesting that alterations in one structure may influence the biomechanics of the other. Although direct continuity of tendon fibers between the plantar fascia and Achilles tendon is not consistently demonstrated histologically, several studies have reported significant morphological and biomechanical associations that may contribute to the development and progression of plantar fasciitis.<sup>4</sup>

Current treatments of plantar fasciitis are based on the premise that the Achilles tendon (AT) and plantar fascia (PF) are mechanically directly linked, which is an area of debate. The aim of this study was to assess the morphological relationship between the AT and PF. Nineteen cadaveric feet were x-ray imaged, serially sectioned and plastinated for digital image analyses. Measurements of the AT and PF thicknesses and cross-sectional areas (CSA) were performed at their calcaneal insertion. The fibre continuity was histologically assessed in representative subsamples. Strong correlations exist between the CSA of the AT and PF at calcaneal insertion and the CSA of PF's insertional length ( $r = 0.80$ ), and between the CSAs of AT's and PF's insertional lengths. Further correlations were observed between AT and PF thicknesses ( $r = 0.62$ ). This close morphological relationship could, however, not be confirmed through x-ray nor complete fiber continuity in histology. This study provides evidence for a morphometric relationship between the AT and PF, which suggests the presence of a functional relationship between these two structures following the biological key idea that the structure determines the function.<sup>5</sup>

## OBJECTIVES

- ❖ To determine the divergence between plantar fasciitis and Achilles tendonitis cases admitted in orthopaedic unit.
- ❖ To determine the association between planter fasciitis and Achilles tendonitis with selected demographic variables.

## Hypothesis

**H<sub>1</sub>:** There will be a significant association between plantar fasciitis and Achilles tendonitis cases admitted in orthopaedic unit.

**H<sub>2</sub>:** There will be a significant association between planter fasciitis and Achilles tendonitis with selected demographic variables.

## Need for the study

The biomechanical properties of the Achilles tendon may change in response to injury, disease, or variations in mechanical loading. Advances in imaging techniques, particularly elastography, have enabled the assessment of tendon stiffness and elasticity in both healthy individuals and patients with musculoskeletal disorders. Recent studies have investigated the relationship between Achilles tendon stiffness and plantar fasciitis to better understand their biomechanical interaction. The primary objectives of these studies were to evaluate the passive stiffness of the Achilles tendon at three standardized locations (0 cm, 3 cm, and 6 cm above the calcaneal tuberosity), compare tendon stiffness between individuals with and without chronic plantar fasciitis, examine the association between tendon stiffness and heel pain, determine optimal stiffness cut-off values for identifying chronic plantar fasciitis, and assess the correlation between plantar fascia thickness and pain severity. These findings suggest that alterations in the mechanical properties of the Achilles tendon may be associated with plantar fasciitis and could aid in its clinical assessment and management.<sup>6</sup>

Ultrasonography (US) is widely used to evaluate heel pain; however, there is no established consensus regarding the diagnostic cut-off value for Achilles tendon thickness in patients with insertional Achilles tendinopathy. Recent studies have investigated the diagnostic value of measuring both the thickness and echogenicity of the Achilles tendon and compared these findings with ultrasonography assessment of the plantar fascia in patients with plantar fasciitis. In a retrospective analysis of patients presenting with unilateral or bilateral heel pain, ultrasonography examinations were performed to assess the insertional region of the Achilles tendon and the plantar fascia. The measurements of tendon and fascia thickness,

along with echogenicity, were compared between patients diagnosed with insertional Achilles tendinopathy, those with plantar fasciitis, and healthy controls. The findings demonstrated that ultrasonography is a valuable diagnostic tool for differentiating these common causes of heel pain, although further research is required to establish standardized diagnostic thresholds for Achilles tendon thickness.<sup>7</sup>

Plantar fascia (PF) disorders commonly cause heel pain and disability in the general population. Imaging is often required to confirm diagnosis. This review article aims to provide simple and systematic guidelines for imaging assessment of PF disease, focussing on key findings detectable on plain radiography, ultrasound and magnetic resonance imaging (MRI). Sonographic characteristics of plantar fasciitis include PF thickening, loss of fibrillar structure, perifascial collections, calcifications and hyperaemia on Doppler imaging. Thickening and signal changes in the PF as well as oedema of adjacent soft tissues and bone marrow can be assessed on MRI. Radiographic findings of plantar fasciitis include PF thickening, cortical irregularities and abnormalities in the fat pad located deep below the PF. Plantar fibromatosis appears as well-demarcated, nodular thickenings that are iso-hypoechoic on ultrasound and show low-signal intensity on MRI. PF tears present with partial or complete fibre interruption on both ultrasound and MRI. Imaging description of further PF disorders, including xanthoma, diabetic fascial disease, foreign-body reactions and plantar infections, is detailed in the main text. Ultrasound and MRI should be considered as first- and second-line modalities for assessment of PF disorders, respectively. Indirect findings of PF disease can be ruled out on plain radiography.<sup>8</sup>

## RESULTS

**Table 1: Determining the number of plantar fasciitis and Achilles tendonitis cases admitted in orthopaedic unit. N= 160**

| Variable          | Plantar Fasciitis |                | Achilles tendonitis |                |
|-------------------|-------------------|----------------|---------------------|----------------|
| Age               | Frequency (f)     | Percentage (%) | Frequency (f)       | Percentage (%) |
| 25-30 years       | 12                | 15             | 13                  | 16.2           |
| 31-35 years       | 26                | 32.5           | 25                  | 31.2           |
| 36-40 years       | 14                | 17.5           | 16                  | 20             |
| >40 years         | 28                | 35             | 26                  | 32.5           |
| <b>Total</b>      | <b>80</b>         | <b>100%</b>    | <b>80</b>           | <b>100%</b>    |
| <b>Gender</b>     |                   |                |                     |                |
| Male              | 34                | 42.5           | 45                  | 56.2           |
| Female            | 46                | 57.5           | 35                  | 43.7           |
| <b>Total</b>      | <b>80</b>         | <b>100%</b>    | <b>80</b>           | <b>100%</b>    |
| <b>Occupation</b> |                   |                |                     |                |
| Private Employees | 14                | 17.5           | 13                  | 16.2           |

|                      |           |             |           |             |
|----------------------|-----------|-------------|-----------|-------------|
| Factory labors       | 16        | 20          | 15        | 18.7        |
| Teachers             | 26        | 32.5        | 24        | 30          |
| Construction workers | 24        | 30          | 28        | 35          |
| <b>Total</b>         | <b>80</b> | <b>100%</b> | <b>80</b> | <b>100%</b> |

Table 1, revealed that, number of plantar fasciitis cases, in accordance to age majority of the findings 28 (35%) belonged to > 40 years, than 26 (32.5%) belonged to 31-35 years, than 14 (17.5%) belonged to 36-40 years, and 12 (15%) belonged to 25-30 years. And number of Achilles tendonitis cases, in accordance to age majority of the findings 26 (32.5%) belonged to > 40 years, than 25 (31.2%) belonged to 31-35 years, than 16 (20%) belonged to 36-40 years, and 13 (16.2%) belonged to 25-30 years.

Number of plantar fasciitis cases, in accordance to gender majority of the findings 46 (57.5%) belonged to females, than 34 (42.5%) belonged to males. And number of Achilles tendonitis cases, in accordance to gender majority of the findings 45 (56.2%) belonged to males than 35 (43.7%) belonged to females.

Number of plantar fasciitis cases, in accordance to occupation majority of the findings 26 (32.5%) belonged to teachers, than 24 (30%) belonged to construction workers, than 16 (20%) belonged to factory labors, than 14 (17.5%) belonged to nursing officers. And number of Achilles tendonitis cases, in accordance to occupation majority of the findings 28 (35%) belonged to construction workers, than 24 (30%) belonged to teachers, than 15 (18.7%) belonged to factory labors, and 13 (16.2%) belonged to private employees.

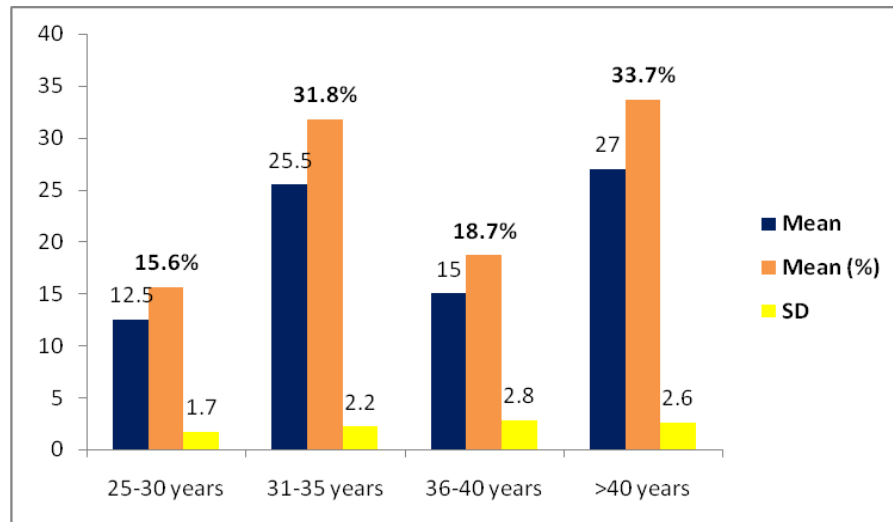
**Table 2: Determining the association between planter fasciitis and Achilles tendonitis with selected demographic variables. N= 160**

| Variables         | Frequency (f) | Mean      | Mean (%)    | SD  | Chi-square           |
|-------------------|---------------|-----------|-------------|-----|----------------------|
| <b>Age</b>        |               |           |             |     |                      |
| 25-30 years       | 25            | 12.5      | 15.6        | 1.7 | $X^2 = 1.288$        |
| 31-35 years       | 51            | 25.5      | 31.8        | 2.2 | DF= 9                |
| 36-40 years       | 30            | 15        | 18.7        | 2.8 | <b>P Value= 0.9*</b> |
| >40 years         | 54            | 27        | 33.7        | 2.6 |                      |
| <b>Total</b>      | <b>160</b>    | <b>80</b> | <b>100%</b> |     |                      |
| <b>Gender</b>     |               |           |             |     |                      |
| Male              | 79            | 39.5      | 49.3        | 3.1 | $X^2 = 1.384$        |
| Female            | 81            | 40.5      | 50.6        | 3.7 | DF= 1                |
| <b>Total</b>      | <b>160</b>    | <b>80</b> | <b>100%</b> |     | <b>P Value= 0.6*</b> |
| <b>Occupation</b> |               |           |             |     |                      |
| Private Employees | 27            | 13.5      | 16.8        | 1.7 | $X^2 = 2.211$        |
| Factory labors    | 31            | 15.5      | 19.3        | 3.9 | DF= 9                |
| Teachers          | 50            | 25        | 31.2        | 4.6 | <b>P Value= 0.9*</b> |

|                      |            |           |             |     |  |
|----------------------|------------|-----------|-------------|-----|--|
| Construction workers | 52         | 26        | 32.5        | 4.7 |  |
| <b>Total</b>         | <b>160</b> | <b>80</b> | <b>100%</b> |     |  |

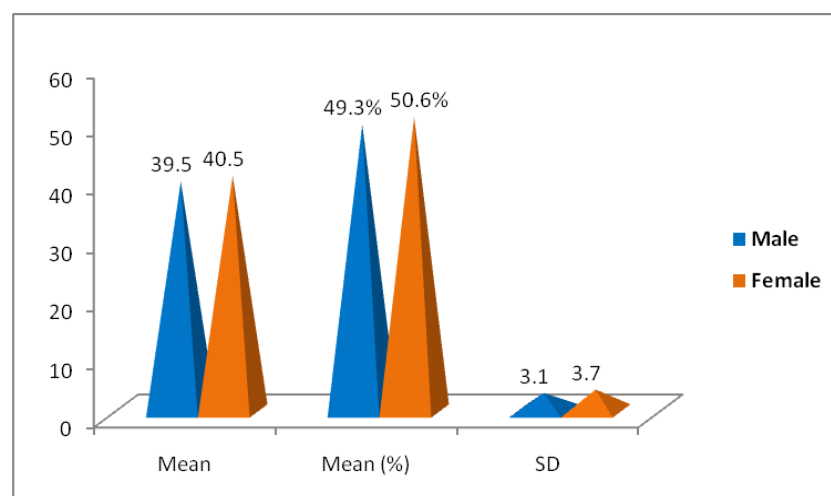
**P Value is > 0.05 levels of significance.**

**Table 2**, revealed that, there will be significant association between planter fasciitis and Achilles tendonitis with selected demographic variables.



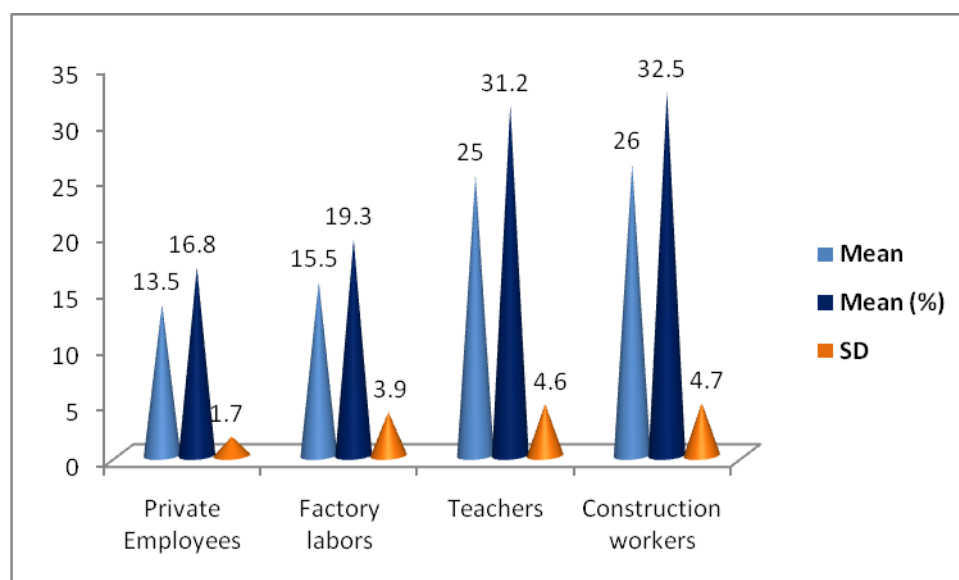
**Graph 1: Age distribution.**

Graph 1, revealed that majority of the findings belonged to > 40 years of their mean is 27, mean percentage 33.7%, and SD + 2.6. More or less similar findings belonged to 31-35 years of their mean is 25.5, mean percentage 31.8%, and SD + 2.2. More or less similar findings belonged to 36-40 years of their mean is 15, mean percentage 18.7%, and SD + 2.8. Less similar findings belonged to 25-30 years of their mean is 12.5, mean percentage 15.6%, and SD + 1.7.



**Graph 2: Gender distribution.**

Graph 2, revealed that majority of the findings belonged to females of their mean is 40.5 mean percentage 50.6, and SD + 3.7. Less similar findings belonged to males of their mean is 39.5 mean percentage 49.3, and SD + 3.1.



**Graph 3: Occupation distribution.**

Graph 3, revealed that majority of the findings belonged to construction workers of their mean is 26, mean percentage 32.5%, and SD + 4.7. More or less similar findings belonged to teachers of their mean is 25, mean percentage 31.2%, and SD + 4.6. More or less similar findings belonged to factory labors of their mean is 15.5, mean percentage 19.3%, and SD + 3.9. Less similar findings belonged to private employees of their mean is 13.5, mean percentage 16.8%, and SD + 1.7.

## DISCUSSION

**In the present study result findings shows that;**

Table 1, revealed that, number of plantar fasciitis cases, in accordance to age majority of the findings 28 (35%) belonged to > 40 years, than 26 (32.5%) belonged to 31-35 years, than 14 (17.5%) belonged to 36-40 years, and 12 (15%) belonged to 25-30 years. And number of Achilles tendonitis cases, in accordance to age majority of the findings 26 (32.5%) belonged to > 40 years, than 25 (31.2%) belonged to 31-35 years, than 16 (20%) belonged to 36-40 years, and 13 (16.2%) belonged to 25-30 years.

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#### **In the similar study result findings shows that**

PFa thickness and AT, AP and ML diameters were significantly higher in the PF group compared to controls ( $p < 0.05$ ). Women had significantly greater PFa thickness than men. Retrocalcaneal bursitis and Achilles tendinopathy were also significantly more common in the PF group ( $p < 0.001$ ). A weak positive correlation was observed between PFa thickness and AT diameters in the control group. Interobserver measurement agreement was high ( $ICC > 0.8$ ). Individuals diagnosed with PF showed increased morphometric characteristics of the AT, indicating a possible mechanical linkage between the plantar fascia and Achilles tendon. The findings support the role of the AT and associated structures in the pathophysiology of PF, emphasizing the importance of a comprehensive assessment of these structures in diagnosis and treatment.

**Ethical Statement:** All procedures related to data protection and patient privacy were conducted in accordance with applicable regulations and institutional policies. Ethical Consideration I/we hereby declare that there are no ethical concerns associated with the study entitled “Evaluate the divergence between plantar fasciitis and Achilles tendonitis cases admitted in orthopaedic unit at tertiary care hospital, Belagavi”. This study should not harm to any humans or animals, and informed consent was taken from all participants’ prior data collection. The name of the affiliated institution is ‘Arihant Institute of Nursing Sciences Belagavi. The ethical committee not found any of the issues in the study and granted us approval for further investigation.

## Article Information and Declarations

### Data availability statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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