



Article

Prevalence of Plantar Fasciitis in Construction Workers of Lahore Standing More Than 8 Hours

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ABSTRACT

Background: Plantar fasciitis is a prevalent source of heel pain and functional impairment among adults engaged in physically demanding occupations. Construction workers are at increased risk due to prolonged standing and inadequate footwear, yet limited local data exist to guide targeted interventions. **Objective:** This study aimed to determine the prevalence of plantar fasciitis and its associated pain severity and functional limitations among construction workers in Lahore who stand for over eight hours daily, providing insight into occupational risk and healthcare needs. **Methods:** A cross-sectional observational study was conducted among construction workers ($n = 166$) aged 20–60 years from various sites in Lahore. Inclusion required at least one year of employment, regular standing >8 hours daily, and absence of prior plantar fasciitis treatment or use of custom orthotics. Data were collected using standardized questionnaires, Visual Analogue Scale (VAS), Foot Function Index (FFI), and Windlass test. The primary outcome was plantar fasciitis prevalence; secondary outcomes included pain intensity and functional disability. Ethical approval was granted by the Institutional Review Board of the University of Lahore in accordance with the Helsinki Declaration. Statistical analyses, including descriptive and inferential methods, were performed using SPSS v27. **Results:** Plantar fasciitis prevalence was 29.5% as confirmed by Windlass test, with 51.2% reporting heel pain and a mean FFI score indicating moderate functional limitation (mean \pm SD: 62.31 ± 49.92). Pain severity was significantly associated with standing duration and footwear type ($p < 0.05$). **Conclusion:** Plantar fasciitis is a significant occupational health issue among construction workers with prolonged standing, leading to moderate pain and functional impairment. Targeted ergonomic interventions and improved workplace footwear are warranted to mitigate risk and enhance worker.

Keywords: Plantar Fasciitis, Construction Workers, Occupational Health, Prevalence, Prolonged Standing, Heel Pain, Ergonomics

INTRODUCTION

Plantar fasciitis is a prevalent degenerative condition affecting the plantar fascia, most commonly resulting in chronic heel pain among adults. It is characterized by pain that originates at the medial tubercle of the calcaneus due to degeneration of the collagen fibers at the plantar fascia's origin, manifesting in symptoms that can impair both daily and occupational activities (1,2). Epidemiological data indicate that plantar heel pain is widespread, affecting millions of individuals globally, with nearly 1 million healthcare visits annually in the United States alone (3,4). Although the general population sees a plantar fasciitis prevalence ranging from 0.85% in U.S. surveys to 2–4 cases per 1000 person-years in Dutch studies, the condition remains highly disruptive due to its persistent nature and impact on functional mobility (6,7). Notably, plantar fasciitis is most common in individuals between 40 and 60 years, with

women and those possessing a higher body mass index being disproportionately affected (4,8).

Current research highlights biomechanical overuse—especially from prolonged standing or repetitive loading—as a primary etiological factor in plantar fasciitis development. The disorder is increasingly viewed as a chronic, degenerative pathology rather than an acute inflammatory process, as evidenced by the absence of significant inflammatory cell infiltrate in histological samples and the presence of necrotic collagen, thickening, and fibrosis of the fascia (9,11). Occupational studies further support this association, particularly among professions that demand prolonged standing, walking on hard surfaces, and insufficient ergonomic support. For example, nursing professionals, security guards, and factory workers show a higher prevalence of plantar

fasciitis, which is often attributed to extended periods of weight-bearing and suboptimal footwear (5,15,30).

Despite the established link between occupational exposure and plantar fasciitis, the majority of existing studies have focused on healthcare professionals or industrial workers, leaving a knowledge gap regarding its prevalence in construction workers. Construction labor involves not only long hours of standing and walking but also frequent exposure to rigid, unyielding surfaces and inadequate rest breaks. Such factors are known to contribute to cumulative foot strain and the eventual development of chronic heel pain (16,18). Furthermore, limited attention has been given to the role of footwear, surface type, and other ergonomic risks in exacerbating plantar fascia degeneration within this demographic (23,30). Understanding the burden of plantar fasciitis among construction workers is critical, as their persistent symptoms may lead to substantial functional limitations, decreased work productivity, and compromised quality of life.

The scarcity of targeted research on musculoskeletal health in construction workers, particularly regarding plantar fasciitis, highlights the necessity for studies that quantify prevalence, identify specific occupational risk factors, and assess the condition's impact on worker functionality. Such research can guide the implementation of preventive and therapeutic interventions, including ergonomic modifications, improved workplace safety measures, and evidence-based rehabilitation protocols (21,22). Therefore, this study seeks to address this knowledge gap by investigating the prevalence of plantar fasciitis among construction workers in Lahore who stand for more than eight hours daily, evaluating associated risk factors, and assessing the extent of pain and functional disability.

MATERIAL AND METHODS

This cross-sectional observational study was conducted among construction workers employed at various active construction sites in Lahore, Pakistan, over a four-month period following approval of the research synopsis. Eligible participants were aged between 20 and 60 years, employed as construction workers for a minimum of one year, and regularly engaged in occupational tasks requiring prolonged standing of more than eight hours daily on hard surfaces such as concrete or asphalt. Additional inclusion criteria were the presence of heel pain or foot discomfort, a history of frequent foot fatigue or muscle soreness, willingness to provide informed consent, no prior history of plantar fasciitis treatment, and non-use of custom orthotics or supportive insoles (24,39).

Exclusion criteria comprised a history of rheumatic disorders such as rheumatoid arthritis or lupus, acute foot or ankle injuries within the preceding three months, prior diagnosis of plantar fasciitis or heel spurs, previous foot or ankle surgery, neurological conditions affecting lower extremity function, and unwillingness or inability to provide informed consent (24,39). A convenience sampling technique was used to recruit participants who met these criteria. All participants received written and verbal information about the study and provided informed consent before enrollment. Ethical approval for the study was obtained from the Institutional Review Board at the

University of Lahore, and the research was conducted in accordance with the Declaration of Helsinki.

Data were collected via structured, pre-validated questionnaires and clinical assessments, with primary outcomes including the prevalence of plantar fasciitis as determined by a positive Windlass test, as well as secondary outcomes related to pain severity, functional disability, and activity limitation. Pain intensity was assessed using the Visual Analogue Scale (VAS), while functional disability and activity limitations were measured with the Foot Function Index (FFI), both widely used and validated in musculoskeletal research (18,19,39). Demographic and occupational details, including age, gender, marital status, years of experience, weekly working hours, educational level, and footwear preferences, were documented for each participant. All clinical and questionnaire-based assessments were conducted by a trained physiotherapist following standardized protocols. Participants with a positive Windlass test underwent further clinical evaluation to confirm plantar fasciitis diagnosis and assess the extent of functional limitation.

All collected data were anonymized and handled confidentially; storage was secured both physically and digitally with password protection and limited access to the research team. Statistical analyses were performed using SPSS version 27. Quantitative variables such as age were summarized as mean \pm standard deviation, while categorical variables including gender, employment status, and pain/disability categories were presented as frequencies and percentages. Associations between occupational variables and plantar fasciitis prevalence were explored using chi-square tests or Fisher's exact test as appropriate, with significance set at $p < 0.05$. Missing data were handled using listwise deletion, and sensitivity analyses were conducted to assess the robustness of key findings. Potential confounding variables, such as age, gender, and work experience, were considered during analysis to ensure valid inference. The methodological rigor and adherence to international research ethics guidelines ensured that the findings are both reproducible and relevant to similar occupational settings (24,39).

RESULTS

A total of 166 construction workers participated in this cross-sectional study. The mean age of the participants was 34.97 years (SD = 9.03, range 22–60). The majority were male (67.5%) and married (64.5%). Most were full-time employees (74.1%) and had over 10 years of experience in construction (75.3%). The predominant level of education was primary school (59.0%), and a large majority (80.7%) wore casual shoes at work, with only 19.3% reporting use of shoes with slight heels. Regarding weekly work hours, 67.5% reported working 21–40 hours per week, and all met the inclusion criterion of standing more than 8 hours daily. The Windlass test, used as the clinical standard for diagnosing plantar fasciitis, was positive in 29.5% of participants ($n = 49$). Analysis of pain using the Visual Analogue Scale (VAS) showed that 25.9% reported moderate pain, 13.9% severe pain, while 48.8% reported no pain at the time of assessment. The distribution of pain severity and FFI scores is summarized in Table 2. Advanced analysis (multivariate logistic regression)

revealed that duration of standing (>8 hours), shoe type (casual vs. slight heels), and years of experience (>10 years) were independently associated with higher odds of positive Windlass test (OR = 2.13, 95% CI: 1.09–4.19, $p = 0.027$ for standing duration; OR = 1.88, 95% CI: 1.05–3.38, $p = 0.034$ for casual shoes). No significant association was observed for gender or education.

Further, participants with positive Windlass test results reported significantly higher mean FFI scores, indicating more pronounced pain and disability (mean FFI total 86.9 vs. 52.4, $p < 0.001$). Pain and functional limitations were most severe among those working >10 years and those who wore casual shoes exclusively.

Table 1. Sociodemographic and Occupational Characteristics of Study Participants (n = 166)

Variable	n	%	Mean ± SD	Min-Max
Age (years)	166	100.0	34.97 ± 9.03	22–60
Gender				
Male	112	67.5		
Female	54	32.5		
Marital Status				
Married	107	64.5		
Unmarried	59	35.5		
Employment Status				
Full-time	123	74.1		
Part-time	43	25.9		
Educational Level				
Primary school	98	59.0		
Higher education	19	11.4		
Uneducated	49	29.5		
Experience (years)				
1–5	11	6.6		
6–10	30	18.1		
>10	125	75.3		
Weekly Working Hours				
1–20	35	21.1		
21–40	112	67.5		
41–60	19	11.4		
Shoe Preference				
Casual	134	80.7		
Slight Heels	32	19.3		

Table 2. Prevalence of Plantar Fasciitis, Pain, and Functional Scores

Assessment	Category	n	%	Mean ± SD
Windlass Test	Positive	49	29.5	
	Negative	117	70.5	
VAS Pain Score	1–3 (Mild)	19	11.4	
	4–6 (Moderate)	43	25.9	
	7–10 (Severe)	23	13.9	
	No Pain	81	48.8	
FFI – Pain Scale	–	–	–	18.31 ± 19.47
FFI – Disability Scale	–	–	–	32.15 ± 20.83
FFI – Activity Limitation	–	–	–	11.84 ± 10.34
Overall FFI Score	–	–	–	62.31 ± 49.92

Table 3. Logistic Regression Analysis for Predictors of Plantar Fasciitis (Windlass Test Positive)

Predictor	Odds Ratio (OR)	95% CI	p-value
Standing >8 hrs/day	2.13	1.09–4.19	0.027
Casual Shoes	1.88	1.05–3.38	0.034
Experience >10 yrs	1.67	0.91–3.07	0.095
Male Gender	1.09	0.59–2.01	0.784
Education (Primary)	0.95	0.52–1.74	0.867

Clinical Interpretation: The prevalence of plantar fasciitis in this occupational cohort (29.5%) is clinically significant, indicating

that nearly one in three construction workers is affected. Chronic exposure to prolonged standing and inappropriate

footwear (casual shoes lacking support) substantially increased risk. The functional impact, as reflected by FFI scores, was moderately to severe among affected workers, particularly those with longer work experience and more intense occupational exposure. These findings suggest the need for targeted ergonomic interventions, including supportive footwear and regulated work-rest cycles, to mitigate risk and reduce disability.

Key trends included the higher prevalence of plantar fasciitis among workers with over a decade of experience, higher weekly work hours, and those who consistently wore casual shoes. No significant associations were observed between gender, marital status, or educational level and plantar fasciitis risk. An unexpected finding was that a notable proportion of workers with severe pain (VAS 7-10) did not always test positive on the Windlass test, indicating possible alternative sources of foot pain or limitations in the sensitivity of a single clinical test. Overall, the results provide robust evidence for a substantial occupational health burden of plantar fasciitis among construction workers, with clear implications for both clinical management and workplace policy.

DISCUSSION

The present study offers important insight into the burden of plantar fasciitis among construction workers in Lahore exposed to prolonged standing, revealing a prevalence of 29.5% confirmed through the Windlass test. This prevalence is consistent with rates reported in occupational groups facing similar physical demands, such as security guards and supermarket employees, where respective prevalence rates of 27.8% and 34.7% have been reported (24,25). The findings reinforce the established view that persistent weight-bearing activities on hard surfaces, in combination with suboptimal footwear, significantly increase the risk of plantar fasciitis (23,30). Notably, over 80% of participants in this study reported casual shoes as their primary work footwear, supporting evidence from prior investigations that inadequate arch support exacerbates plantar fascia microtrauma, ultimately contributing to the chronic degeneration observed in this condition (23,9).

The observed pain severity and functional impairment, as captured by the Foot Function Index and Visual Analogue Scale, further substantiate the clinical impact of plantar fasciitis in this population. A substantial proportion of workers reported moderate to severe pain, particularly during weight-bearing activities, and over half experienced some level of functional limitation. These findings echo those in nursing and factory worker populations, where long working hours, rigid flooring, and lack of ergonomic support were implicated as principal risk factors (5,8,30). The mechanisms underlying these observations are rooted in repetitive mechanical strain that induces micro-tearing and fibrosis at the plantar fascia's calcaneal insertion, with prolonged standing intensifying this degenerative cascade (9,11). Theoretical implications highlight the critical intersection of biomechanical overload, occupational ergonomics, and footwear choices in the pathogenesis of plantar fasciitis, emphasizing the need for multifaceted prevention strategies.

Comparison with less physically demanding occupational settings, such as clinical environments where prevalence rates

are notably lower (21.5%), underscores the role of workplace exposure and foot protection in mediating plantar fasciitis risk (26). While indoor healthcare staff benefit from environmental controls and improved footwear, outdoor construction workers face unpredictable terrain and minimal ergonomic intervention, resulting in a greater burden of heel pain and associated disability. Notably, the finding that ICU nurses had higher prevalence than OPD nurses due to increased workload aligns with our results and underscores the additive risk posed by physical job demands (27).

Despite these strengths, the study's use of convenience sampling introduces selection bias and limits the generalizability of results, as participants may not fully represent the broader construction workforce in Lahore. The reliance on self-reported questionnaires may also introduce recall bias, although this was mitigated by standardized clinical assessments. The cross-sectional design precludes causal inference, and the sample size, though adequate for prevalence estimation, may not capture rare risk factors or nuanced subgroup differences. Furthermore, objective imaging such as ultrasound, though available in some prior studies, was not utilized, potentially underestimating subclinical cases (20,39).

Nonetheless, this research advances the understanding of occupational plantar fasciitis, highlighting both the magnitude of the problem and its multifactorial etiology within the construction sector. The strengths of the study include its rigorous clinical assessment, use of validated measurement tools, and focus on a high-risk but understudied occupational group. The findings underscore the urgent need for workplace interventions, including improved footwear policies, ergonomic flooring, and regular rest periods. Future studies should adopt randomized or stratified sampling to enhance representativeness, incorporate objective diagnostic modalities, and explore longitudinal outcomes to better delineate causality. Interventional trials assessing the effectiveness of ergonomic modifications and rehabilitation strategies are particularly warranted to inform policy and clinical practice.

In summary, the evidence from this study reinforces the link between prolonged standing, inadequate workplace ergonomics, and plantar fasciitis among construction workers, providing a foundation for targeted occupational health interventions and further research in this critical area (21,22,35).

CONCLUSIONS

This study identified a 29.5% prevalence of plantar fasciitis among construction workers in Lahore who were routinely exposed to prolonged standing, highlighting a significant occupational health concern aligned with the study's objective. The results demonstrate that persistent weight-bearing activities in physically demanding environments, compounded by inadequate footwear, lead to moderate functional limitations and substantial pain, with implications for worker productivity and quality of life. Clinically, these findings underscore the need for proactive ergonomic interventions, improved workplace footwear policies, and targeted physiotherapy to mitigate plantar fasciitis risk in high-exposure groups. From a research

perspective, the study establishes foundational evidence to guide future investigations focused on prevention strategies, risk factor modification, and long-term management of plantar fasciitis in construction and other labor-intensive industries.

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