JHWCR JOURNAL OF HEALTH, WELLNESS AND COMMUNITY RESEARCH 3007-0570

DOI: https://doi.org/10.61919/48q9wf36

Original Article

Association Between Prolonged Standing Duration and Pain Severity Among School Teachers with Plantar Fasciitis: A Cross-Sectional Study

Aiman Rehman[1], Asma Akram[2], Aqsa Majeed[3], Laiba Qamar[4], Reshmina Shoaib[5], Muqadas Ashraf[6], Samia Sohail[6], Sadaf Anjum[2]

[1] Physiotherapist, University Institute of Physical Therapy, University of Lahore, Lahore, Pakistan
[2] Lecturer, University Institute of Physical Therapy, University of Lahore, Lahore, Pakistan
[3] Lecturer, University Institute of Physical Therapy, University of Lahore, Lahore, Pakistan
[4] Physical Therapist
[5] Student, Stella College of Medical and Allied Health Sciences, Quetta, Pakistan
[6] Student, University Institute of Physical Therapy, University of Lahore, Lahore, Pakistan

*** Corresponding author: Asma Akram, asma.akram@uipt.uol.edu.pk**

"Cite this Article" Received: 12 March 2026; **Accepted**: 18 June 2026; **Published**: 04 July 2026

Author Contributions: Concept: AR, AA; Design: AA, AM, SA; Data Collection: AR, LQ, RS, MA, SS; Analysis: AR, AA; Drafting: AR, AM, SA. **Ethical Approval**: University of Lahore, Lahore, Pakistan. **Informed Consent**: Written informed consent was obtained from all participants; **Conflict of Interest**: The authors declare no conflict of interest. **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request; **Acknowledgments**: NA

ABSTRACT

Background: Plantar fasciitis is a common cause of plantar heel pain and functional limitation, particularly among occupational groups exposed to prolonged standing. School teachers frequently stand for extended periods during lectures, classroom supervision, and routine academic activities, which may increase mechanical loading on the plantar fascia and aggravate symptoms. Objective: To determine the association between daily standing duration and plantar fasciitis-related pain and disability among school teachers. Methods: This cross-sectional study included 136 school teachers from Lahore, Pakistan. Participants aged 25–40 years with at least six months of teaching experience were recruited using non-probability convenience sampling. Plantar fasciitis was clinically screened using the Windlass Test. Demographic and occupational data were collected using a structured questionnaire, and pain/disability severity was assessed using the Plantar Fasciitis Pain/Disability Scale. Data were analyzed using SPSS version 26. Pearson correlation analysis examined the relationship between daily standing duration and PFPS score, with statistical significance set at $p < 0.05$. Results: The mean age of participants was 32.29 ± 4.61 years, and 98 participants (72.1%) were female. Mean standing duration was 7.15 ± 1.77 hours/day, and mean PFPS score was 56.01 ± 10.72. Moderate pain was reported by 105 participants (77.2%), while 28 participants (20.6%) reported severe pain. Standing duration showed a strong positive correlation with PFPS score ($r = 0.849$, 95% CI: 0.794–0.890; $p < 0.001$). Conclusion: Longer daily standing duration was strongly associated with greater plantar fasciitis-related pain and disability among school teachers. Occupational modifications, scheduled rest breaks, ergonomic strategies, footwear guidance, and physiotherapy education may help reduce symptom burden. Keywords: Plantar Fasciitis, Heel Pain, School Teachers, Prolonged Standing, Occupational Health, Pain Severity, PFPS

INTRODUCTION

Plantar fasciitis is one of the most frequent causes of plantar heel pain in adults and represents a clinically important musculoskeletal condition affecting mobility, occupational performance, and quality of life. The plantar fascia is a dense fibrous connective structure extending from the medial calcaneal tubercle to the proximal phalanges, where it contributes to maintenance of the medial longitudinal arch and assists normal gait mechanics through load transmission during weight-bearing activity (1). Although plantar fasciitis has traditionally been described as an inflammatory disorder, contemporary evidence suggests that persistent symptoms are more closely related to repetitive mechanical overload, microtrauma, collagen disorganization, and degenerative fascial changes rather

than isolated acute inflammation (2). Clinically, the condition commonly presents with sharp plantar heel pain, particularly during the first steps after waking or after prolonged inactivity, and symptoms may worsen during extended standing, walking, or other weight-bearing activities (3).

The development and persistence of plantar fasciitis are influenced by a combination of intrinsic and extrinsic factors. Intrinsic contributors include increased body mass index, altered foot biomechanics, excessive pronation, reduced ankle dorsiflexion, age-related tissue changes, and impaired load tolerance of the plantar fascia, while extrinsic contributors include inappropriate footwear, repetitive occupational loading, prolonged standing, and extended walking duration (4). The condition affects a substantial proportion of adults during their lifetime and contributes considerably to foot-related healthcare use, functional restriction, and reduced participation in daily and occupational activities (5). In occupational populations, the clinical relevance of plantar fasciitis is amplified because symptoms can interfere with job performance, attendance, productivity, and sustained participation in physically demanding work roles.

In Pakistan and comparable occupational settings, plantar heel pain and plantar fasciitis have been reported among workers whose duties require prolonged weight-bearing, including security personnel, traffic wardens, healthcare workers, and teachers (6–8). These groups share repeated exposure to long periods of standing and walking, often with limited rest intervals and variable footwear support. However, it is important to distinguish between factors associated with the occurrence of plantar fasciitis and factors associated with symptom severity among individuals who already have the condition. Many previous studies have focused on prevalence and general risk factors, whereas fewer studies have quantified whether the duration of daily standing is related to pain and disability severity among diagnosed individuals.

School teachers represent a particularly relevant occupational group for this question. Teaching commonly involves prolonged standing during lectures, classroom supervision, student management, and administrative responsibilities, often across several consecutive working hours. This pattern may increase cumulative mechanical loading on the plantar fascia and may aggravate symptoms among teachers with established plantar fasciitis. Previous local studies have indicated that plantar fasciitis is common among teachers and working women exposed to prolonged occupational standing, supporting the need to examine the burden of this condition in educational settings (9,10). Beyond pain alone, plantar fasciitis may restrict walking tolerance, reduce occupational efficiency, limit participation in recreational activities, and contribute to work-related disability (11). Evidence also suggests that greater plantar fasciitis severity may be associated with functional limitations, absenteeism, presenteeism, and reduced workplace productivity among teachers (12).

Although prolonged standing has repeatedly been discussed as an occupational risk factor for lower-extremity musculoskeletal symptoms, the direct relationship between daily standing duration and plantar fasciitis pain/disability severity among school teachers remains insufficiently defined. Nawaz et al. reported that standing duration and standing-to-sitting ratio were associated with heel pain among young professionals, while Tamir Tsehay et al. found that prolonged standing was associated with ankle-foot pain among nurses working in surgical units (13,14). These findings support the biological plausibility that sustained weight-bearing may contribute to greater foot and ankle symptoms. Nevertheless, teacher-specific evidence using a plantar fasciitis-specific pain/disability measure remains limited, particularly in local school settings where work routines, footwear habits, and opportunities for rest may differ from other occupational groups.

The present study was therefore designed using a PICO-oriented framework in which the population comprised school teachers aged 25–40 years with plantar fasciitis, the exposure was longer daily standing duration, the comparison was relatively shorter standing duration within the same occupational group, and the outcome was pain and disability severity measured using the Plantar Fasciitis Pain/Disability Scale. Because standing duration is a potentially modifiable occupational exposure, identifying its

relationship with symptom severity may help guide workplace modifications, ergonomic advice, scheduled rest breaks, footwear counseling, and physiotherapy-led prevention strategies. The objective of this study was to determine the association between daily standing duration and pain/disability severity among school teachers with plantar fasciitis. The study hypothesis was that longer standing duration would be positively associated with higher Plantar Fasciitis Pain/Disability Scale scores among school teachers with plantar fasciitis.

MATERIALS AND METHODS

This cross-sectional observational study was conducted among school teachers in Lahore, Pakistan, to examine the relationship between daily standing duration and pain/disability severity among individuals with plantar fasciitis. The study design was selected because the objective was to assess the association between occupational standing exposure and symptom severity at a single point in time rather than to test the effect of an intervention or establish longitudinal causality. Data collection was completed over a six-month period following approval of the research synopsis. Teachers were recruited using a non-probability convenience sampling technique, and a total of 136 eligible participants were included in the final analysis.

The target population comprised school teachers with occupational exposure to classroom-based standing activities. Participants were eligible if they were aged 25–40 years, had at least six months of teaching experience, and fulfilled the clinical screening criterion for plantar fasciitis based on the Windlass Test. Teachers were excluded if they were administrative staff without regular teaching duties, pregnant females, individuals with visible foot deformities, traumatic low back pain, previous heel surgery, neurological disorders, Achilles tendinopathy, diabetes mellitus, peripheral vascular disease, or other chronic systemic diseases that could independently influence foot pain, lower-limb sensation, vascular status, or walking capacity. These criteria were applied to improve clinical homogeneity and reduce alternative explanations for plantar heel pain.

Participants were approached after permission for data collection, and the study purpose, procedures, voluntary nature of participation, and confidentiality safeguards were explained before enrollment. Written informed consent was obtained from all participants before data collection. Each participant first underwent clinical screening for plantar fasciitis using the Windlass Test. Participants who met the eligibility criteria then completed a structured demographic and occupational questionnaire. The questionnaire recorded age, sex, body weight, height, daily standing duration, daily walking duration, exercise participation, and footwear type. Body mass index was calculated from recorded weight and height and expressed in kg/m^2. Daily standing duration was operationally defined as the average number of hours per day spent standing during routine teaching-related activities, while walking duration was defined as the average number of hours per day spent walking during work and daily activities.

Pain and disability related to plantar fasciitis were assessed using the Plantar Fasciitis Pain/Disability Scale. The PFPS score was treated as the primary outcome variable, with higher scores indicating greater pain and disability. Pain severity categories were derived from PFPS scoring categories and reported as mild, moderate, or severe according to the scale-based classification used during data recording. The primary exposure variable was daily standing duration measured in hours per day. Additional variables collected for descriptive and confounding assessment included age, sex, BMI, walking duration, exercise participation, and footwear type. These variables were selected because they may influence plantar fascia loading, symptom persistence, functional limitation, or pain perception.

Several steps were incorporated to reduce bias and improve data integrity. Eligibility criteria were applied before final enrollment to reduce misclassification from non-plantar causes of heel pain. A single structured data collection format was used for all participants to maintain consistency across responses. Participants were instructed to report their usual daily standing and walking duration based on routine work patterns rather than unusually light or heavy days. Completed forms were reviewed for missing or

inconsistent entries before data entry. Data were entered into SPSS version 26 and checked for completeness, coding accuracy, range errors, and consistency between questionnaire responses and computed variables. Records with incomplete information for the primary exposure or primary outcome were not included in the correlation analysis.

Descriptive statistics were used to summarize demographic, occupational, and clinical characteristics. Continuous variables, including age, weight, height, BMI, standing duration, walking duration, and PFPS score, were summarized using mean and standard deviation. Categorical variables, including sex and PFPS severity categories, were summarized using frequencies and percentages. The primary analysis examined the bivariate association between daily standing duration and PFPS score using Pearson correlation analysis because both variables were recorded as continuous measures. Statistical significance was set at $p < 0.05$, and p-values less than 0.001 were reported as $p < 0.001$ rather than as zero. Because age, sex, BMI, walking duration, exercise participation, and footwear type may act as potential confounders, these variables were retained as clinically relevant covariates for interpretation and for further adjusted modeling where complete participant-level data are available. Given the cross-sectional design, all findings were interpreted as associations rather than evidence of causality.

The study was conducted in accordance with ethical principles for human participant research. Participation was voluntary, informed consent was obtained before data collection, and participant confidentiality was maintained throughout data handling and analysis. Data were used only for research purposes, and individual participant identities were not disclosed in the analysis or reporting.

RESULTS

A total of 136 school teachers with plantar fasciitis were included in the analysis. The demographic, occupational, and clinical characteristics of the participants are presented in Table 1.

Table 1. Demographic, Occupational, and Clinical Characteristics of Participants (n = 136)

Variable	Mean ± SD / n (%)
Age, years	32.29 ± 4.61
Female	98 (72.1)
Male	38 (27.9)
Weight, kg	70.50 ± 10.17
Height, ft	5.47 ± 0.29
BMI, kg/m²	25.63 ± 4.69
Standing duration, hours/day	7.15 ± 1.77
Walking duration, hours/day	2.46 ± 0.93
PFPS score	56.01 ± 10.72
Mild pain	3 (2.2)
Moderate pain	105 (77.2)
Severe pain	28 (20.6)

PFPS: Plantar Fasciitis Pain/Disability Scale; SD: standard deviation.

The mean age of participants was 32.29 ± 4.61 years, and most participants were female, with 98 females representing 72.1% of the sample. The mean BMI was 25.63 ± 4.69 kg/m². Participants reported an average standing duration of 7.15 ± 1.77 hours/day and an average walking duration of 2.46 ± 0.93 hours/day. The mean PFPS score was 56.01 ± 10.72. Based on the recorded severity categories, moderate pain was the most frequent presentation, reported by 105 participants (77.2%), followed by severe pain in 28 participants (20.6%) and mild pain in 3 participants (2.2%).

Table 2. Correlation Between Standing Duration and PFPS Score Among School Teachers With Plantar Fasciitis (n = 136)

Variables	r	95% CI	r^2	p-value
Standing duration and PFPS score	0.849	0.794 to 0.890	0.721	<0.001

Pearson correlation analysis was used. CI: confidence interval; PFPS: Plantar Fasciitis Pain/Disability Scale.

Pearson correlation analysis demonstrated a strong positive relationship between daily standing duration and PFPS score. The correlation coefficient was 0.849, with a 95% confidence interval from 0.794 to 0.890 and a p-value less than 0.001. The coefficient of determination was 0.721, indicating that approximately 72.1% of the observed variation in PFPS scores was statistically shared with standing duration in this bivariate analysis. This finding indicates that teachers who reported longer standing duration also tended to report higher plantar fasciitis-related pain and disability scores. Because the analysis was cross-sectional and unadjusted, this result should be interpreted as an association rather than evidence of an independent or causal effect of standing duration.

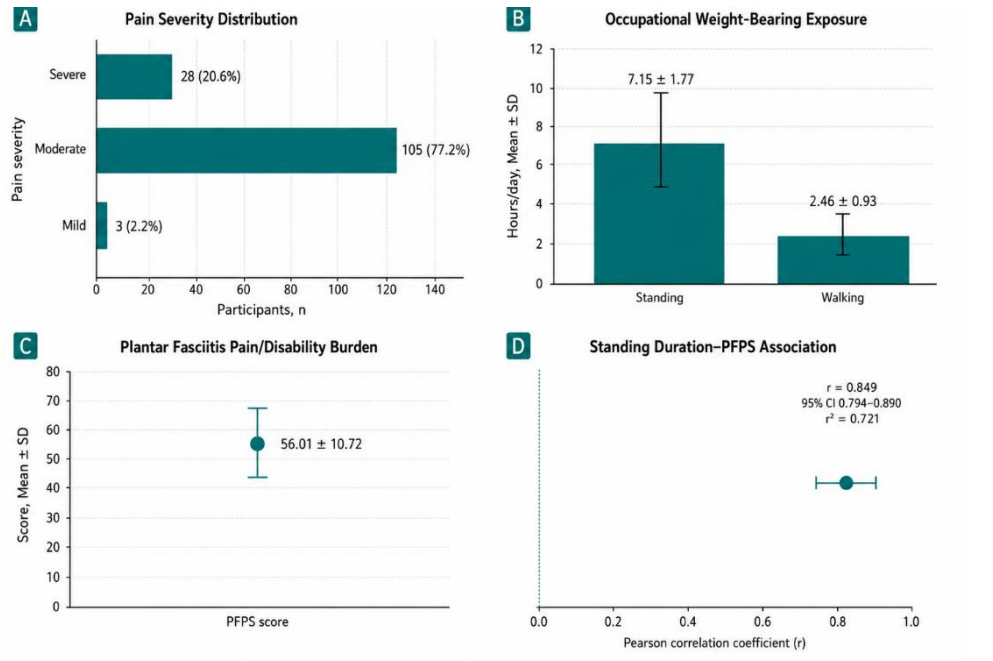

Figure 1 The figure summarizes the occupational and clinical profile of 136 school teachers with plantar fasciitis. Moderate pain was the dominant severity category, affecting 105 participants (77.2%), while severe pain was reported by 28 participants (20.6%) and mild pain by 3 participants (2.2%). Mean standing duration was 7.15 ± 1.77 hours/day, exceeding mean walking duration of 2.46 ± 0.93 hours/day, indicating a substantial daily weight-bearing exposure. The mean PFPS score was 56.01 ± 10.72, reflecting a clinically relevant pain/disability burden. Standing duration showed a strong positive association with PFPS score (r = 0.849, 95% CI: 0.794–0.890; r^2 = 0.721; p < 0.001), indicating that longer standing duration was closely associated with higher plantar fasciitis-related pain and disability in this cross-sectional sample.

DISCUSSION

The present study examined the association between daily standing duration and plantar fasciitis-related pain and disability among school teachers. The findings demonstrated a strong positive correlation between standing duration and PFPS score, indicating that teachers who reported longer standing duration also tended to report greater pain and disability. The average standing duration exceeded seven hours per day, suggesting a substantial occupational weight-bearing exposure in this population. Because the study used a cross-sectional design and bivariate correlation analysis, the findings should be interpreted as evidence of association rather than proof that prolonged standing independently caused greater plantar fasciitis severity.

The observed association is biologically plausible because prolonged standing increases cumulative loading across the plantar fascia, particularly during sustained weight bearing on hard surfaces or during repeated transitions between static standing and walking. The plantar fascia contributes to arch support and load distribution during gait, and repeated tensile stress may increase microtrauma and fascial degeneration in susceptible individuals (1,2). Clinically, plantar fasciitis is commonly aggravated by standing and walking, which is consistent with the symptom pattern observed in occupational groups exposed to prolonged lower-limb loading (3,4). In the present study, the mean PFPS score was 56.01 ±

10.72, and most participants reported moderate pain, indicating that plantar fasciitis represented a meaningful functional burden among affected teachers.

The present findings are consistent with previous occupational health literature showing that prolonged standing and high standing-to-sitting ratios are associated with heel pain and lower-extremity musculoskeletal symptoms. Nawaz et al. reported that standing duration and standing-to-sitting ratio were associated with heel pain among young professionals, supporting the relevance of occupational weight-bearing exposure in the development or persistence of heel symptoms (13). Similarly, Tamir Tsehay et al. reported that prolonged standing was associated with ankle-foot pain among nurses working in surgical units, a population that shares occupational similarities with teachers because both groups spend long periods standing and walking during routine duties (14). These findings strengthen the interpretation that continuous or repeated weight-bearing exposure may be clinically relevant in populations vulnerable to plantar heel pain.

The findings also align with previous local evidence on plantar fasciitis among teachers and working women. Studies conducted in Pakistani occupational settings have reported plantar fasciitis and heel pain among groups exposed to prolonged standing, including teachers, nurses, traffic wardens, and security personnel (6–10). Sufi et al. further reported that plantar fasciitis among teachers was associated with functional limitations and reduced work productivity, supporting the view that this condition affects more than pain alone and may interfere with occupational performance (12). The high proportion of moderate and severe pain in the present study similarly suggests that plantar fasciitis among teachers may have important implications for workplace functioning, mobility, and quality of life.

However, the current findings should be interpreted with attention to methodological differences across previous studies. Some studies have examined the prevalence of plantar fasciitis or heel pain in occupational groups, whereas the present study focused specifically on pain and disability severity among teachers already identified as having plantar fasciitis. This distinction may explain why some previous work has not found standing duration to be the strongest predictor of plantar fasciitis occurrence. For example, Hashmi et al. reported age as a key factor among female teachers, whereas the present analysis suggests that standing duration is closely related to symptom severity within an affected teacher population (17). Therefore, standing duration may be more relevant as a contributor to symptom burden among diagnosed individuals than as a sole determinant of disease occurrence.

The strength of the observed correlation was high, with $r = 0.849$ and $p < 0.001$. This indicates a strong statistical relationship between standing duration and PFPS score in the available dataset. The derived coefficient of determination suggested that a large proportion of variation in PFPS score was statistically shared with standing duration in the bivariate analysis. Nevertheless, this value should not be interpreted as evidence that standing duration alone explains plantar fasciitis severity. Other factors, including BMI, sex, age, walking duration, footwear type, exercise habits, foot posture, ankle dorsiflexion, work surface, rest-break patterns, and previous treatment history, may influence pain severity and functional disability. Because the current manuscript reports Pearson correlation rather than multivariable regression, the independent contribution of standing duration after adjustment for these factors remains uncertain.

The study has several limitations. First, the cross-sectional design prevents temporal or causal inference. It cannot determine whether longer standing increased PFPS scores, whether teachers with more severe symptoms perceived standing duration differently, or whether both were influenced by other occupational or biomechanical factors. Second, the use of convenience sampling from Lahore limits generalizability to teachers in other cities, rural settings, or different school systems. Third, standing and walking duration were self-reported, which may introduce recall bias or reporting error. Fourth, although BMI, walking duration, footwear type, and exercise habits were collected, the available results do not report an adjusted analysis. This limits the ability to control for confounding. Fifth, the Windlass Test and PFPS scale require clearer reporting in the Methods section, including diagnostic procedure, scoring range, and severity cutoffs, to improve reproducibility. Finally, the very strong correlation should

be interpreted cautiously and ideally confirmed using individual-level scatterplots, assumption testing, and multivariable modeling.

Despite these limitations, the study addresses an important occupational health issue in a population with repeated daily exposure to prolonged standing. The findings suggest that reducing continuous standing time, introducing scheduled sitting or rest intervals, improving footwear support, optimizing classroom ergonomics, and providing physiotherapy-led education may be reasonable strategies for symptom management and prevention. Future studies should use longitudinal or interventional designs, objective standing-time measurement, standardized biomechanical assessment, and adjusted regression models to determine whether reducing occupational standing exposure leads to clinically meaningful improvement in plantar fasciitis pain and disability.

CONCLUSION

School teachers with plantar fasciitis who reported longer daily standing duration also demonstrated higher plantar fasciitis-related pain and disability scores. The strong positive correlation between standing duration and PFPS score suggests that prolonged occupational standing is an important factor associated with symptom severity in this population. Because the study was cross-sectional and based on unadjusted correlation analysis, the findings should be interpreted as an association rather than evidence of causality. Workplace modifications, scheduled rest breaks, footwear guidance, ergonomic strategies, and physiotherapy-based preventive education may help reduce symptom burden among affected teachers, but further longitudinal and adjusted analytical studies are required to confirm the independent effect of standing duration on plantar fasciitis severity.

REFERENCES

1. Biz C, Fan C. Anatomy of the plantar fascia. In: Fascia: The Tensional Network of the Human Body. Edinburgh: Churchill Livingstone; 2021. p. 348.
2. Rhim HC, Kwon J, Park J, Borg-Stein J, Tenforde AS. A systematic review of systematic reviews on the epidemiology, evaluation, and treatment of plantar fasciitis. Life (Basel). 2021;11(12):1287.
3. Trojian T, Tucker AK. Plantar fasciitis. Am Fam Physician. 2019;99(12):744-750.
4. Arnold MJ, Moody AL. Common running injuries: evaluation and management. Am Fam Physician. 2018;97(8):510-516.
5. Palomo-López P, Becerro-de-Bengoa-Vallejo R, Losa-Iglesias ME, Rodríguez-Sanz D, Calvo-Lobo C, López-López D. Impact of plantar fasciitis on the quality of life of male and female patients according to the Foot Health Status Questionnaire. J Pain Res. 2018;11:875-880.
6. Ul Abidin SZ, Haneef K, Malik NR, Mashal M, Haneef K, Zeb A, et al. Prevalence and associated risk factors for plantar fasciitis among security forces personnel in Peshawar. Ann Allied Health Sci. 2019;5(2):20-23.
7. Idrees M, Ahmad A, Gilani SA. Frequency of plantar fasciitis among traffic wardens of Lahore. 2019.
8. Sikander MS, Shinwari NU, Shah J, Atif M, Jan SIU, Naz M. Prevalence and association of risk factors for plantar fasciitis among nurses in government tertiary care hospitals of Peshawar. J Health Rehabil Res. 2024;4(2):1623-1628.
9. Aiman U, Malik L, Zahoor A. Pain and difficulty level in working females having plantar fasciitis of Multan city. Pak Biomed J. 2022;5(8):46-50.
10. Mukhtar S, Nasir MS, Tuba T, Tahir E, Azmat K, Mazhar Z, et al. Prevalence of planter fasciitis among school teachers in Lahore, Pakistan. Pak J Med Cardiological Rev. 2026;5(2):2279-2291.

11. Mørk M, Soberg HL, Hoksrud AF, Heide M, Groven KS. The struggle to stay physically active: a qualitative study exploring experiences of individuals with persistent plantar fasciopathy. J Foot Ankle Res. 2023;16(1):20.

12. Sufi HL, Safdar A, Shahbaz A, Amir W, Javed HR, Rajput R. Association of plantar fasciitis with functional limitations and work productivity among teachers. J Health Wellness Community Res. 2025.

13. Nawaz I, Bukhari A, Shafique QW, Aiman U, Rafique U, Jabeen S, et al. Factors associated with heel pain in young professional. Pak J Med Health Sci. 2023;17(05):16.

14. Tamir Tsehay Y, Lamesgin Endalew H, Dessalegn Bogale A, Walle TA. Prevalence and associated factors of ankle-foot pain among nurses working in surgical units of comprehensive specialized hospitals in Amhara Regional State, Northwest Ethiopia. J Pain Res. 2023;16:2685-2696.

15. Ahmad D, Sattar A, Zulfiqar Z, Afzal Z, Ain Q, Ashiq H, et al. The prevalence and effects of plantar fasciitis on functional activities among doctors and nurses in Sialkot, a cross-sectional survey. J Health Rehabil Res. 2024;4(1):1525-1529.

16. Hashmi R, Naeem L, Arif S, Habiba U, Irfan R, Zafar M. Frequency of plantar fasciitis among females in teaching profession. J Aziz Fatimah Med Dent Coll. 2020;2(2):53-57.