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PREVALENCE OF PLANTAR FASCIITIS AND ITS ASSOCIATION WITH DEMOGRAPHIC FACTORS AMONG FEMALE SCHOOLTEACHERS

Original Research

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ABSTRACT

Background: Plantar fasciitis is a leading cause of heel pain and functional limitation, particularly in occupations involving prolonged standing. Teachers, due to extended periods of weight-bearing activities, are at an increased risk of developing this condition. Although plantar fasciitis has been widely studied in various professions, limited data are available on its prevalence among primary school teachers in Pakistan. Understanding its occupational and demographic associations is essential for targeted prevention and management strategies.

Objective: To determine the prevalence of plantar fasciitis and its association with demographic and occupational factors among female primary school teachers in Rawalpindi and Islamabad.

Methods: This descriptive cross-sectional study was conducted from February to July 2022 on 243 female primary school teachers recruited from government and private schools using a non-probability convenience sampling technique. Inclusion criteria comprised teachers aged 24–65 years, with at least one year of teaching experience and heel pain. Those who were pregnant or had medical conditions, heel spurs, or recent foot injuries were excluded. Data were collected using a semi-structured questionnaire, incorporating demographic details, occupational characteristics, Visual Analogue Scale (VAS) for pain, and the Plantar Fasciitis Pain and Disability Scale (PFPS). Data analysis was performed using SPSS version 26, with chi-square tests applied to assess associations.

Results: The mean age of participants was 38.15 ± 9.3 years, with 55.5% aged 24–35 years. The mean PFPS score was 40.57 ± 11.48. Plantar fasciitis prevalence was 75.2%, and heel pain was reported by 86.4% of participants. Moderate pain on VAS was most common (56.4%). Significant associations were found between plantar fasciitis and age ($p = 0.036$) and BMI ($p = 0.042$), while standing duration and footwear type showed no association.

Conclusion: Plantar fasciitis was highly prevalent among young female primary school teachers, with most experiencing moderate heel pain. Age and BMI were significant associated factors, emphasizing the need for targeted workplace interventions.

Keywords: Body Mass Index, Heel Pain, Occupational Diseases, Pain Measurement, Plantar Fasciitis, Prevalence, Teachers.

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INTRODUCTION

Plantar fasciitis is a common degenerative condition of the plantar fascia, a thick fibrous structure originating from the medial calcaneal tuberosity and extending along the sole of the foot, playing a vital role in maintaining the medial longitudinal arch and absorbing shock during weight-bearing activities (1). The fascia comprises three distinct segments, all of which originate from the calcaneus, and are integral to optimal foot biomechanics. Despite its name, the condition is not inflammatory in nature, as histological evidence reveals an absence of inflammatory cells, suggesting a degenerative rather than inflammatory pathology (1,2). Plantar fasciitis is among the most frequent causes of heel pain, with an estimated lifetime incidence of approximately 10% in the general population (2). Patients typically present with localized pain at the proximal plantar fascia, especially near its calcaneal attachment, which is aggravated by activities such as walking, running, or prolonged standing, and is often most pronounced during the first steps in the morning or after extended periods of rest (2,3). Although the precise etiology remains unclear, plantar fasciitis is widely considered to result from repetitive microtrauma and cumulative mechanical stress on the fascia (2). Multiple risk factors have been identified, including high body mass index (BMI), prolonged weight-bearing, reduced ankle dorsiflexion, and the presence of calcaneal spurs, which are found in 45%–85% of cases (3). Additional biomechanical and structural contributors described in the literature include excessive foot pronation, pes cavus, tight Achilles tendon, leg length discrepancies, poorly fitting footwear, obesity, abnormal gait patterns, and occupations involving long hours of standing or walking (4). These factors can lead to pathological overloading at the calcaneal insertion, causing microtears, perifascial edema, and increased heel pad thickness (5). This thickening reduces flexibility of the posterior foot structures, disrupts normal biomechanics, and impairs shock absorption, thereby perpetuating excessive tensile loading and accelerating degenerative changes such as collagen necrosis, fibroblastic hyperplasia, chondroid metaplasia, and calcific deposits within the fascia (6,7).

Several studies have highlighted the influence of occupational factors on the development of plantar fasciitis, particularly in professions requiring prolonged standing or walking on hard surfaces (8). Individuals in occupations such as teaching, traffic control, security services, and nursing have shown a higher prevalence of heel pain linked to plantar fasciitis (9,10). A study conducted in Lahore in 2019 reported a prevalence of 38.7% among traffic wardens, with symptoms strongly associated with daily standing and walking for 4–8 hours (10). While non-operative measures—including rest, ice application, activity modification, and nonsteroidal anti-inflammatory drugs—are effective in approximately 85–90% of cases, prevention through addressing modifiable risk factors remains critical (11). Despite extensive research on plantar fasciitis in various occupational groups, there is limited evidence regarding its prevalence among primary school teachers in Pakistan. Existing studies have primarily focused on other musculoskeletal disorders or on populations such as secondary and college teachers, nurses, and security personnel, with minimal emphasis on heel pain disorders in primary school educators. Considering that female primary school teachers in Pakistan often engage in prolonged standing during teaching hours, this population may be particularly vulnerable. Therefore, the current study aims to determine the prevalence of plantar fasciitis among female primary school teachers in Rawalpindi and Islamabad and to explore its association with age, BMI, working hours, and type of footwear.

METHODS

This descriptive cross-sectional study was conducted between February 2022 and July 2022 following approval from the Institutional Review Board of the University (IRB/DPT/1020-1303). The sample size was determined using Slovin's formula, $n = N / (1 + Ne^2)$, assuming a total population of 627 primary school teachers, with a 95% confidence level and a 5% margin of error. This calculation yielded a sample size of 243 participants. A non-probability convenience sampling technique was employed for recruitment. The target population comprised primary school teachers from Rawalpindi and Islamabad who were aged between 24 and 65 years, had at least one year of teaching experience, and reported complaints of heel pain. Teachers were excluded if they were pregnant, had a history of hypertension or diabetes, presented with congenital deformities of the foot or ankle, had heel spurs, or had a history of foot surgery, fracture, or trauma within the preceding six months. Prior to data collection, written informed consent was obtained from all participants after explaining the study's purpose, procedures, and their right to withdraw at any stage without consequences. Participation was voluntary, and no potential harm or risks were anticipated. A semi-structured questionnaire was used for data collection, comprising sections on demographic details, occupational information (including working hours, standing duration, and teaching experience),

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footwear type, comorbidities, symptomatology of plantar fasciitis, and pain severity using the Visual Analogue Scale (VAS). Functional limitation and pain-related disability were assessed using the Plantar Fasciitis Pain and Disability Scale (PFPS), a validated tool with scores ranging from 1 to 100 points. A cut-off score of more than 35 points on the PFPS was considered indicative of plantar fasciitis. Quantitative variables such as age and BMI were expressed as mean ± standard deviation, while qualitative variables such as footwear type and presence of plantar fasciitis were reported as frequencies and percentages. The Chi-square test of independence was used to assess associations between plantar fasciitis and age, BMI, working hours, and footwear type. A p-value of less than 0.05 was considered statistically significant. Data analysis was performed using SPSS Version 26.

RESULTS

The study included 185 female primary school teachers with a mean age of 38.15 ± 9.3 years. The mean height was 5.43 ± 0.37 ft, mean weight was 60.96 ± 9.34 kg, and mean BMI was 22.40 ± 4.17 kg/m². More than half of the participants (55.5%) were aged 24–35 years, while 58.8% fell into the healthy BMI category (18.5–24.9 kg/m²). Teaching experience of one to three years was reported by 57.6% of respondents. Nearly half (46.1%) spent four or more hours daily in a standing posture, and 95.8% worked five days per week. The majority (46.1%) taught three to four classes per day, and 52.7% wore flat shoes during work. Heel pain was reported by 86.4% of the participants. Based on the Visual Analogue Scale, 7.9% reported no pain, 17.6% mild pain, 56.4% moderate pain, and 18.2% severe pain. The mean Plantar Fasciitis Pain/Disability Scale score was 40.57 ± 11.48. Deep pain was experienced by 66.7% of the teachers, and prolonged standing was the most frequently cited cause (75.2%). Morning stiffness was present in 82.4% of participants, and 87.3% experienced heel pain immediately after standing in the morning. Stabbing pain in the toes after the first morning step was reported by 85.5%, with 47.9% localizing the pain to the bottom of the heel. Pain lasting between one to two hours was most common (51.5%). Functional impact assessment revealed that 57% experienced severe difficulty walking in the morning, and 39.4% had severe difficulty walking barefoot. Difficulty in standing after watching a movie was severe in 33.9% of participants. Physical activities such as standing on toes, climbing stairs, and descending stairs were also significantly affected in a notable proportion of teachers.

Statistical analysis demonstrated a significant association between plantar fasciitis and age ($p = 0.036$), BMI ($p = 0.042$), and teaching experience ($p = 0.006$). No significant associations were found with school type ($p = 0.755$), shoe type ($p = 0.121$), or standing duration ($p = 0.167$). Based on the predefined diagnostic cut-off score of greater than 35 on the Plantar Fasciitis Pain/Disability Scale, the overall prevalence of plantar fasciitis in the study population was found to be 63.8%. When stratified by BMI, the prevalence was highest among overweight participants (72.5%), followed by obese participants (60.0%), healthy-weight participants (59.8%), and underweight participants (56.5%). Regarding working hours in a standing posture, the prevalence was slightly higher among those standing for four or more hours daily (66.2%) compared to those standing for three hours (61.3%) or two hours (57.1%). In terms of footwear, participants wearing flats showed the highest prevalence (65.5%), followed by those wearing heels (61.7%), joggers (57.7%), and other types (40.0%). These additional analyses provide a more comprehensive understanding of the distribution of plantar fasciitis within the sample and further contextualize the observed associations between plantar fasciitis and individual risk factors.

Table 1: Demo-Graph and Information Related to Job

Variable	Frequency	Percentage
Age categories		
24-35 years	75	55.5
26-45 years	53	32.1
46-55 years	29	17.6
56-65 years	40	15.2
BMI categories		
<18.5 underweight	23	13.9
18.5-24.9 healthy	97	58.8
25.0-29.9 overweight	40	24.2
>30.0 obese	5	3
Teaching experience		
1 to 3 years	95	57.6

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Variable	Frequency	Percentage
More than 3 years	70	42.4
Standing duration		
2 hours	14	8.5
3 hours	75	45.5
4 hours or more	76	46.1
Number of working days		
4 days	7	4.2
5 days	158	95.8
Number of classes per day		
2 classes	8	4.8
2-3 classes	21	12.7
3-4 classes	76	46.1
More than 4 classes	60	36.4
Shoe type		
Heels	47	28.5
Flats	87	52.7
Joggers	26	15.8
others	5	3
Heel pain at present		
Yes	165	86.4
No	20	13.6

Table 2: Description of Pain

Variables		Frequency	Percentage
Depth of pain	Surface	55	33.3
	Deep	110	66.7
Cause of pain	Prolonged standing	124	75.2
	Walking for too long	32	19.4
	Jogging	1	6
	Running	8	4.8
Morning stiffness in foot	Yes	136	82.4
	No	29	17.6
Heel pain right after standing in the morning	Yes	144	87.3
	No	21	12.7
Stabbing pain in toes after taking 1st step in morning	Yes	141	85.5
	No	24	14.5
Pain location	Toes	6	3.6
	Ball of the foot	16	9.7
	Mid sole	64	38.8
	Bottom of the heel	79	47.9
Frequency of pain in the past 6 weeks	Every other week	12	7.3
	Once a week	59	35.8
	Once a day	81	49.1
	Many times, a day	13	7.9

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Variables		Frequency	Percentage
Pain free duration	Weeks	17	10.3
	Days	55	33.3
	Hours	74	44.8
	Minutes	19	11.5
How long does the pain last	Only when I overexert	15	9.1
	Pain lasts for less than 1 hour	43	26.1
	Pain lasts for 1 to 2 hours	85	51.5
	Pain lasts for more than 2 hours	22	13.3
Pain gets worst at what time of day	Always the same	14	8.5
	Only in the afternoon	28	17
	Both days and night	40	24.2
	Only when you first get up	83	50.3
Difficulty in sleep due to pain in past 6 weeks	Never	14	8.5
	Some nights	83	50.3
	Most nights	57	34.5
	Every night	11	6.7

Table 3: Effects of Pain on Physical Activity

Variables	Not at all n (%)	Very little n (%)	Moderate n (%)	Severe n (%)
Difficulty to walk in the morning	11 (6.7)	31 (18.1)	29 (17.6)	94 (57)
Difficulty to stand on toes	11 (6.7)	51 (30.9)	61 (37)	42 (25.5)
Difficulty in driving	82 (49.7)	35 (21.2)	35 (21.2)	13 (7.9)
Difficulty in climbing stairs	9 (5.5)	98 (59.4)	43 (26.1)	15 (9.1)
Difficulty in descending stairs	14 (8.5)	93 (56.4)	42 (25.5)	16 (9.7)
Difficulty in reaching up	31 (18.8)	86 (52.1)	33 (20)	15 (9.1)
Difficulty in bending over	68 (41.2)	42 (25.5)	41 (24.8)	14 (8.5)
Difficulty to walk bare foot	13 (7.9)	34 (20.6)	53 (32.1)	65 (39.4)
Difficulty to stand after watching a movie	53 (32.1)	30 (18.2)	26 (15.8)	56 (33.9)
Difficulty to ride a bike	160 (78.8)	2 (9.7)	3 (11.5)	59 (38.8)
Difficulty in running a short distance	2 (9.7)	69 (41.8)	31 (18.8)	6 (3.6)

Table 4: Association of Planter Fasciitis with Age, BMI, School Type, Teaching Experience, Standing Duration, Shoe Wear

Factors	X2	p-value
Age	23.745	0.036***
BMI	8.203	0.042***
School type	0.097	0.755
Teaching experience	7.599	0.006***
Standing duration	2.109	0.167
Shoe type	5.812	0.121

Table 5: Plantar Fasciitis Prevalence by Category

Category		Prevalence (%)
Overall Prevalence		63.8
BMI	Underweight (<18.5)	56.5
	Healthy (18.5–24.9)	59.8

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Category		Prevalence (%)
	Overweight (25.0–29.9)	72.5
	Obese (>30.0)	60.0
Standing Duration	– 2 hours	57.1
	– 3 hours	61.3
	≥4 hours	66.2
Footwear	Heels	61.7
	Flats	65.5
	Joggers	57.7
	Others	40.0

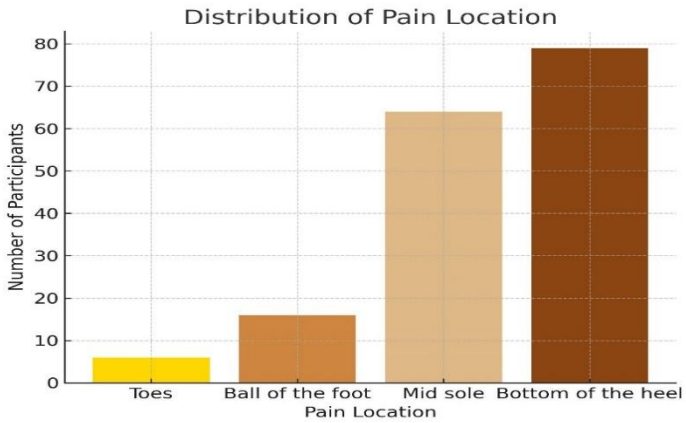


Figure 1 Distribution of Pain Location

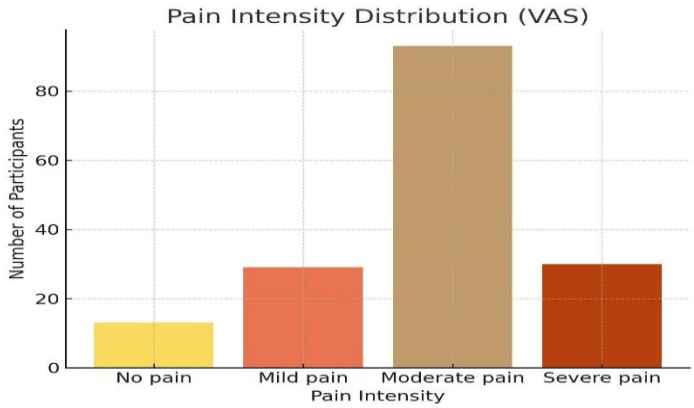


Figure 2 Pain Intensity Distribution (VAS)

DISCUSSION

Plantar fasciitis is recognized as the most common cause of infracalcaneal pain and can significantly impair daily activities, resulting in discomfort and functional limitations. The present study demonstrated a prevalence of plantar fasciitis of 75.2% among female primary school teachers, with heel pain reported in 86.4% of participants. Most participants experienced moderate pain localized to the bottom of the heel, and the mean score on the Plantar Fasciitis Pain/Disability Scale exceeded the diagnostic threshold, confirming the burden of this condition within the studied group. Significant associations were observed between plantar fasciitis and age, BMI, and teaching experience, highlighting the contribution of both intrinsic and occupational factors to disease development. The observed prevalence aligns with findings from other occupational health research where a high proportion of teachers reported foot pain, particularly following prolonged standing, with prevalence rates ranging from 70% to over 80% in some cohorts (12). Previous literature has also described age-related structural changes in the plantar fascia, including increased thickness and reduced echogenicity, which may be more pronounced in females (13). The association with age found in this study is consistent with reports that older individuals, particularly women, are at greater risk, possibly due to cumulative biomechanical stress and degenerative changes in connective tissue. Conversely, some studies have shown higher prevalence in older age groups, with no significant association with BMI or standing hours (14), indicating that variations in population demographics, working conditions, and diagnostic criteria may influence results.

High BMI has been repeatedly linked to plantar fasciitis in the literature, with overweight and obese individuals experiencing higher plantar fascia loading and reduced shock absorption (15,16). The present findings reinforce this association, particularly as overweight participants showed the highest prevalence. Occupational factors, including prolonged standing and unsuitable footwear, have been reported to exacerbate plantar fascia strain. While this study did not find a statistically significant relationship between shoe type and plantar fasciitis, other research has linked high-heeled or ill-fitting shoes to worsening symptoms (17,18). In contrast, certain studies have associated minimal heel height with severe pain, suggesting that both extremes of heel height can be detrimental depending on gait

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mechanics and load distribution (18). The multifactorial nature of plantar fasciitis has been emphasized in several reviews, where risk factors include biomechanical abnormalities, obesity, repetitive strain, and occupational exposure (19,20). The high prevalence observed in this study may also be related to the cumulative effects of standing for extended periods, particularly in teaching environments with limited opportunities for rest. Reports from other occupational groups, such as healthcare workers and retail employees, have shown comparable prevalence, supporting the role of workplace ergonomics in foot health (21).

This study's strengths include its focus on a specific occupational group that has been underrepresented in plantar fasciitis research in Pakistan and the use of a validated tool (PFPS) for diagnosis. The findings contribute to the understanding of occupational risk factors in primary school teachers and highlight the need for preventive workplace interventions. However, certain limitations should be acknowledged. The cross-sectional design precludes conclusions about causality or progression of symptoms. The study population consisted solely of female primary school teachers, limiting the generalizability of results to other teaching levels, genders, or professions. The use of non-probability sampling may also introduce selection bias, and the exclusion of participants with heel spurs, despite their frequent coexistence with plantar fasciitis, could underestimate prevalence in broader populations. Future research should aim to include larger and more diverse samples, incorporate longitudinal follow-up to monitor disease progression, and explore the impact of targeted ergonomic interventions, footwear modifications, and structured exercise programs. Additionally, more detailed analysis of occupational tasks and floor surfaces in teaching environments may provide insights into modifiable risk factors. This approach could inform preventive strategies aimed at reducing the functional and occupational burden of plantar fasciitis among teachers and other at-risk professions.

CONCLUSION

Plantar fasciitis was found to be more prevalent among young female primary school teachers, with most experiencing moderate heel pain that affected their daily activities. The condition showed a clear association with both age and body mass index, underscoring the role of intrinsic and occupational factors in its development. These findings highlight the need for preventive measures in school settings, including ergonomic interventions, appropriate footwear selection, and workplace modifications, to reduce the risk and impact of plantar fasciitis in this vulnerable population.

AUTHOR CONTRIBUTION

Author	Contribution
Hafsah Arshad*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Hafsah Gul Khattak	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Ayesha Sana	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Nayab Khan	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Syeda Uswa e Maryam	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Misbah Razzaq	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Zainab Shaukat	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Ayesha Zafar	Writing - Review & Editing, Assistance with Data Curation

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