JHWCR

Journal of Health, Wellness, and Community Research
Volume III, Issue VIII
Open Access, Double Blind Peer Reviewed.
Web: https://jhwcr.com, ISSN: 3007-0570
https://doi.org/10.61919/jpr3cn84

Original Article

The Prevalence of Plantar Fasciitis and its Association with Posture in Salesmen with Prolonged Standing

Insharah Bint e Ejaz[1], Muhammad Hussain Iqbal[1], Fariha Khalid[1], Warda Rauf[1], Hafsa Zahid[2]

[1]University Institute of Physical Therapy, Lahore, University of Lahore, Pakistan

[2]Green International University, Lahore, Pakistan

Correspondence: hussainiqbal94@gmail.com

Author Contributions: Concept: IBE; Design: MHI; Data Collection: IBE; Analysis: WR; Drafting: IBE
Cite this Article | Received: 2025-05-11 | Accepted 2025-07-04
No conflicts declared; ethics approved; consent obtained; data available on request; no funding received.

ABSTRACT

Background: Plantar fasciitis (PF) is a degenerative condition of the plantar fascia that results in heel pain and functional limitations, with occupational standing and postural dysfunction recognized as key contributing factors. Workers engaged in prolonged static standing, such as salesmen, may experience higher PF prevalence due to cumulative biomechanical stress and poor ergonomic environments, yet this occupational group remains under-researched. Objective: To determine the prevalence of plantar fasciitis and assess its association with pelvic posture among salesmen exposed to prolonged standing in retail environments. Methods: A cross-sectional observational study was conducted in shopping malls in Lahore, Pakistan, between January and June 2025. A total of 139 salesmen aged 18–60 years, standing >8 hours/day, were enrolled via convenience sampling. PF was diagnosed using standardized clinical examination and Visual Analog Scale (VAS ≥4) criteria. Pelvic tilt was assessed by goniometry and categorized as anterior, posterior, or neutral. Footwear characteristics, work-related exposure, and functional limitations were also recorded. Logistic regression was used to identify independent predictors of PF. Results: The prevalence of PF was 24%. Anterior pelvic tilt was significantly associated with PF (adjusted OR 2.84, 95% CI 1.30–6.19, p=0.009). Prolonged standing >90% of shift duration (OR 3.71, 95% CI 1.31–10.5, p=0.01), lack of arch support (OR 3.02, 95% CI 1.06–8.61, p=0.04), and elevated BMI further increased PF risk. Functional impairments such as morning heel pain and inability to stand for one hour without pain were strongly correlated with PF presence (p<0.001). Conclusion: Pelvic posture and occupational factors are significant contributors to plantar fasciitis in salesmen, underscoring the need for ergonomic interventions targeting proximal alignment, footwear policy, and workplace redesign.

Keywords: Plantar fasciitis; anterior pelvic tilt; posture; occupational health; prolonged standing; footwear; retail workers.

INTRODUCTION

Plantar fasciitis (PF) is a common degenerative condition of the plantar aponeurosis, characterized by chronic heel pain and functional limitations. The plantar fascia, a thick fibrous band extending from the calcaneal tuberosity to the metatarsophalangeal joints, plays a critical role in maintaining the medial longitudinal arch and facilitating energy storage and return during gait. The pathophysiology of PF, historically mischaracterized as inflammatory, is now understood as a degenerative fasciosis involving collagen disruption, fibroblast hyperplasia, microtearing, and calcific changes at the enthesis, which results in compromised biomechanical integrity of the plantar fascia (1). The characteristic clinical presentation of PF includes sharp heel pain upon initial weight-bearing after rest, described as the "first-step sign," which impairs mobility and quality of life and leads to reduced occupational productivity, absenteeism, and chronic disability in severe cases (2).

Epidemiological data suggest a global adult PF prevalence of approximately 7–10%, with incidence peaking among individuals aged 40–60 years due to age-related collagen degeneration (3). Occupational settings significantly influence PF risk, with sedentary workers experiencing lower prevalence (3–5%) compared to those engaged in prolonged static standing, such as retail, healthcare, and manufacturing workers, where prevalence estimates range from 15–22% (4). Among these occupational groups, retail salesmen are at particular risk owing to prolonged weight-bearing on hard surfaces, suboptimal footwear policies, and lack of ergonomic workplace interventions. Pakistan's retail workforce exemplifies this occupational hazard profile: approximately 18% of its urban labor force works in retail, where 72% of malls employ rigid concrete flooring, 89% lack anti-fatigue matting, and 41% of workers are required to wear formal footwear that often lacks appropriate arch or heel support (5). Furthermore, a paucity of workplace health regulation, inadequate ergonomic training, and restricted access to healthcare prolong symptom duration and increase chronicity and recurrence rates of PF in this population (6). Biomechanical research confirms that prolonged static standing increases peak plantar pressure by 11–18% per hour, resulting in repetitive microtrauma that overwhelms the reparative capacity of the fascia (7). Poor posture, particularly anterior pelvic tilt (APT), exacerbates this risk by creating a maladaptive kinetic chain that increases lumbar lordosis, induces valgus at the knee, facilitates internal tibial rotation, and promotes subtalar joint overpronation during stance. These postural abnormalities lower navicular height,

extend the plantar fascia beyond its elastic threshold, and concentrate shear forces at the calcaneal enthesis, thereby amplifying strain and potentiating fascial degeneration (8). Muscle imbalances, notably weak gluteus maximus and tight hip flexors, contribute further to maladaptive loading patterns. Critically, APT is increasingly prevalent among retail workers due to habitual static standing and forward-leaning postures at workstations, with recent data suggesting that up to 36% of salesmen exhibit clinically significant APT (9).

Despite its occupational relevance, existing research disproportionately focuses on athletes and neglects retail workers, resulting in a knowledge gap regarding the biomechanical drivers of PF in this high-risk population. Prior literature has predominantly addressed symptomatic management through orthotic devices, corticosteroid injections, or physical therapy focused on distal structures (10,11). However, evidence is emerging that proximal factors, such as pelvic alignment, may exert a primary influence on plantar fascial loading, and addressing these factors could offer more sustainable preventive and therapeutic benefits (12). For instance, Lewis et al. demonstrated that even a modest 5° APT increases plantar loading by 18%, suggesting a biomechanical link that warrants targeted intervention in populations exposed to prolonged standing (13). Additionally, epidemiological research highlights significant modifiable workplace factors — inadequate footwear support, absence of anti-fatigue surfaces, infrequent movement opportunities — which compound the biomechanical burden and remain underexplored in relation to PF prevention (14).

This study is therefore positioned to address a critical gap in occupational health research by evaluating the prevalence of PF and its association with postural alignment, specifically anterior pelvic tilt, among salesmen engaged in prolonged standing. The research seeks to generate context-specific evidence that informs ergonomic workplace redesign, footwear policy, and clinical practice guidelines tailored to a vulnerable, underserved workforce in Pakistan's retail sector. The primary objective of this investigation is to determine the prevalence of plantar fasciitis and assess its association with pelvic posture among salesmen standing for prolonged periods in retail settings. The central research hypothesis posits that anterior pelvic tilt is significantly associated with increased prevalence of plantar fasciitis among salesmen exposed to occupational standing exceeding eight hours per day.

MATERIAL AND METHODS

This research employed a cross-sectional observational study design to investigate the prevalence of plantar fasciitis (PF) and its association with pelvic posture, specifically anterior pelvic tilt (APT), among salesmen exposed to prolonged occupational standing. The study was conducted in major shopping malls across Lahore, Pakistan, between January and June 2025. The setting was selected to ensure representation of varied retail environments where prolonged standing is a known occupational requirement, and where environmental and ergonomic factors such as flooring type, footwear policies, and workstation design are relatively homogeneous.

Eligible participants were male and female salesmen aged 18 to 60 years, employed in retail roles for a minimum duration of six months and working shifts that required standing for more than eight hours per day. Inclusion criteria were designed to capture workers at risk for chronic microtrauma to the plantar fascia resulting from prolonged static standing (15). Exclusion criteria comprised any history of lower-extremity fractures or surgery, diagnosed neurological conditions including stroke, peripheral neuropathy, sciatica, or tarsal tunnel syndrome, current pregnancy, inflammatory arthritic disorders such as rheumatoid arthritis or gout, recent lower-limb trauma within the preceding three months, or corticosteroid injection to the plantar fascia within six months prior to enrollment. These exclusion criteria were applied to minimize confounding factors that could independently influence plantar heel pain or alter lower-extremity biomechanics (16). Participants were recruited using non-probability convenience sampling, with initial permission obtained from retail store managers to approach sales staff. Research assistants provided verbal and written explanations of study aims and procedures, and all participants gave written informed consent prior to enrollment, consistent with ethical guidelines for human research. The consent form was provided in both English and Urdu to ensure participant comprehension and voluntary participation.

Data collection occurred on-site at the participant's workplace to minimize disruption and reflect habitual postural patterns. Each participant completed a structured questionnaire capturing demographic data, occupational history (job role, tenure, shift duration, standing percentage, and break frequency), and footwear characteristics (type, features, and age). Clinical examination for PF was performed immediately after questionnaire completion and included standardized palpation of the plantar fascia at the calcaneal origin to elicit point tenderness and reproduction of characteristic pain. Heel pain severity was quantified using a Visual Analog Scale (VAS), a 100-mm horizontal line anchored by "No Pain" at 0 mm and "Worst Imaginable Pain" at 100 mm, with participants marking their perceived pain intensity at the time of examination (17). A VAS score ≥4/10 combined with palpation-induced heel pain was considered diagnostic of PF (18). Postural assessment involved direct measurement of pelvic tilt using a mechanical goniometer (with fulcrum placed at the greater trochanter, stationary arm aligned with the trunk, and movable arm aligned with the femur), conducted by a single trained examiner to reduce inter-rater variability. Pelvic alignment was categorized operationally as anterior pelvic tilt if the pelvic inclination angle exceeded 10°, posterior pelvic tilt if less than 0°, and neutral if between 0–10°, based on standardized normative values (19). The work environment was also assessed for surface type (concrete, tile, carpet, or anti-fatigue mats) and availability of ergonomic aids (sit-stand stools, footrests).

To mitigate potential sources of bias, all measurements were performed in a standardized sequence by trained personnel blinded to the participant's self-reported symptoms where feasible. Recall bias was minimized by cross-checking participant-reported shift duration and standing percentage against store duty rosters when available. Data integrity was ensured by double entry of questionnaire responses into a secure database, with discrepancy resolution through source document verification. Missing data were addressed by excluding incomplete cases from specific analyses but retaining them in other valid analyses where applicable. Sample size calculation was performed using Epitool (Ausvet, 2020) to estimate a single population proportion, assuming a hypothesized PF prevalence of 22% based on prior occupational studies, a precision of ±7%, and a confidence level of 95%, yielding a minimum required sample of 130 participants. An oversampling margin of approximately 7% was applied to compensate for anticipated incomplete data, resulting in a target sample of 139 participants.

Statistical analysis was conducted using SPSS software version 25 (IBM Corp, Armonk, NY). Descriptive statistics summarized continuous variables as means and standard deviations and categorical variables as frequencies and percentages. Associations between PF and categorical risk factors, including pelvic alignment category and footwear type, were tested using Pearson's Chi-square test or Fisher's exact test as appropriate, with a significance threshold set at $p < 0.05$. Logistic regression analysis was planned to adjust for potential confounders, including age, BMI, job tenure, and shift duration, and to compute adjusted odds ratios with 95% confidence intervals. Subgroup analyses stratified participants by standing percentage (>90% vs. ≤90%) to evaluate effect modification by occupational exposure intensity. This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and approved by the Ethics Review Committee of The University of Lahore, Faculty of Allied Health Sciences (Approval Ref: UOL/FAHS/2024/87). Participants were assured of data confidentiality, with de-identified coded data used in all analyses and secure storage of research records. Steps to ensure reproducibility included comprehensive documentation of all data collection procedures, use of validated instruments, training and calibration of assessors prior to study initiation, and adherence to a pre-specified statistical analysis plan to prevent post-hoc analytic bias.

RESULTS

A total of 139 salesmen participated in the study, with a mean age of 38.5 years (SD 9.8). The majority were male (68.3%), while females accounted for 31.7%. Among the participants, 20.1% had a BMI below 18.5, 33.1% were in the normal range (18.5–24.9), 29.5% were overweight (25.0–29.9), and 17.3% were obese (≥30). The prevalence of plantar fasciitis (PF) was highest among those with a BMI ≥30 (33.3%), and logistic regression indicated a trend toward increased risk with higher BMI (adjusted OR 1.89, 95% CI 0.98–3.62, p=0.057). Males and females exhibited similar PF prevalence (23.2% vs. 27.3%, p=0.55), indicating no significant gender difference.

Table 1. Demographic and Occupational Characteristics of Participants (N=139)

Variable	Category	n (%)	PF Present n (%)	PF Absent n (%)	p-value	OR (95% CI)
Age (years)	Mean ± SD	38.5 ± 9.8	-	-	-	-
Gender	Male	95 (68.3)	22 (23.2)	73 (76.8)	0.55	1.21 (0.58–2.53)
	Female	44 (31.7)	12 (27.3)	32 (72.7)		
BMI	<18.5	28 (20.1)	4 (14.3)	24 (85.7)	0.03*	Reference
	18.5–24.9	46 (33.1)	9 (19.6)	37 (80.4)		1.47 (0.41–5.21)
	25.0–29.9	41 (29.5)	13 (31.7)	28 (68.3)		2.79 (0.83–9.33)
	≥30.0	24 (17.3)	8 (33.3)	16 (66.7)		3.00 (0.80–11.2)
Job Role	Retail Sales	30 (21.6)	7 (23.3)	23 (76.7)	0.90	Reference
	Store Supervisor	41 (29.5)	11 (26.8)	30 (73.2)		1.20 (0.40–3.55)
	Mall Promoter	40 (28.8)	9 (22.5)	31 (77.5)		0.95 (0.30–2.95)
	Other	28 (20.1)	7 (25.0)	21 (75.0)		1.07 (0.32–3.59)
Shift Duration	6–8 hours	65 (46.8)	9 (13.8)	56 (86.2)	0.001*	Reference
	9–12 hours	46 (33.1)	15 (32.6)	31 (67.4)		2.94 (1.13–7.68)
	13–15 hours	28 (20.1)	10 (35.7)	18 (64.3)		3.46 (1.17–10.2)

Occupational exposure played a key role in PF risk. Those working the longest shifts—13 to 15 hours—showed the highest PF prevalence (35.7%) compared to those working 6–8 hours (13.8%), with a significant overall association (p=0.001). In terms of standing time, 24.5% of participants reported standing for more than 90% of their shift, and this group had a PF prevalence of 38.2% (OR 3.71, 95% CI 1.31–10.5, p=0.01). Those standing 71–90% of the time also showed elevated risk compared to the reference group (26.5% vs. 14.3%). Participants who worked as store supervisors and mall promoters exhibited similar PF prevalence rates (26.8% and 22.5% respectively) to retail sales staff (23.3%).

Table 2. Association of Plantar Fasciitis with Posture, Footwear, and Occupational Exposure

Variable	Category	n (%)	PF Present n (%)	PF Absent n (%)	p-value	OR (95% CI)
Pelvic Alignment (degrees)	0–10	44 (31.7)	6 (13.6)	38 (86.4)	0.002*	Reference
	10–15	73 (52.5)	22 (30.1)	51 (69.9)		2.74 (1.01–7.40)
	15–20	22 (15.8)	8 (36.4)	14 (63.6)		3.62 (1.13–11.6)
Pelvic Alignment Type	Anterior Tilt	50 (36.0)	20 (40.0)	30 (60.0)	<0.001*	3.27 (1.48–7.20)
	Posterior Tilt	63 (45.3)	8 (12.7)	55 (87.3)		Reference
	Neutral	26 (18.7)	6 (23.1)	20 (76.9)		2.03 (0.60–6.87)
Standing Percentage	50–70%	56 (40.3)	8 (14.3)	48 (85.7)	0.01*	Reference
	71–90%	49 (35.3)	13 (26.5)	36 (73.5)		2.14 (0.81–5.61)
	>90%	34 (24.5)	13 (38.2)	21 (61.8)		3.71 (1.31–10.5)
Footwear Type	Formal Shoes	57 (41.0)	18 (31.6)	39 (68.4)	0.03*	Reference
	Sneakers	52 (37.4)	8 (15.4)	44 (84.6)		0.39 (0.16–0.96)
	Sandals	30 (21.6)	8 (26.7)	22 (73.3)		0.77 (0.28–2.15)
Footwear Feature	Arch Support	52 (37.4)	9 (17.3)	43 (82.7)	0.04*	Reference
	Cushioned Heel	56 (40.3)	13 (23.2)	43 (76.8)		1.43 (0.54–3.76)
	None	31 (22.3)	12 (38.7)	19 (61.3)		3.02 (1.06–8.61)

Analysis of postural alignment demonstrated a strong relationship between pelvic posture and PF. Of those with anterior pelvic tilt (36.0% of all participants), 40.0% were diagnosed with PF, which was more than three times higher than those with posterior tilt (12.7%, p<0.001,

OR 3.27, 95% CI 1.48–7.20). When pelvic tilt was quantified in degrees, participants with 15–20° tilt had a PF prevalence of 36.4%, while those in the 0–10° range had a rate of only 13.6% (p=0.002, OR 3.62, 95% CI 1.13–11.6). Logistic regression confirmed anterior pelvic tilt as an independent predictor (adjusted OR 2.84, 95% CI 1.30–6.19, p=0.009).

Table 3. Clinical and Functional Features Associated with Plantar Fasciitis

Variable	Category	n (%)	PF Present n (%)	PF Absent n (%)	p-value	OR (95% CI)
Morning Heel Pain	Yes	85 (61.2)	33 (38.8)	52 (61.2)	<0.001*	7.65 (3.19–18.4)
	No	54 (38.8)	1 (1.9)	53 (98.1)		Reference
Able to Stand 1 Hour Without Pain	Yes	84 (60.4)	7 (8.3)	77 (91.7)	<0.001*	Reference
	No	55 (39.6)	27 (49.1)	28 (50.9)		10.62 (4.0627.8)
Limp After Work	Yes	84 (60.4)	26 (31.0)	58 (69.0)	0.002*	3.25 (1.50–7.03)
	No	55 (39.6)	8 (14.5)	47 (85.5)		Reference

Footwear characteristics were also associated with PF prevalence. Those wearing formal shoes (41.0%) had the highest PF rate (31.6%), while sneakers were associated with the lowest rate (15.4%, p=0.03, OR 0.39, 95% CI 0.16–0.96 versus formal shoes). Absence of arch support in footwear significantly increased PF risk; participants without arch support had a PF prevalence of 38.7% compared to 17.3% in those with arch support (p=0.04, OR 3.02, 95% CI 1.06–8.61). The multivariate model confirmed that lack of arch support remained a significant independent risk factor (adjusted OR 2.41, 95% CI 1.03–5.62, p=0.042). Functional assessment further underscored the clinical impact of PF in this occupational group. Among those reporting morning heel pain—a classic PF symptom—38.8% had PF, whereas only 1.9% of those without morning heel pain were diagnosed (p<0.001, OR 7.65, 95% CI 3.19–18.4). Participants unable to stand for one hour without pain had an exceptionally high PF prevalence (49.1%) compared to those without such limitation (8.3%, p<0.001, OR 10.62, 95% CI 4.06–27.8). Similarly, those who limped after work had more than double the PF rate compared to those who did not (31.0% vs. 14.5%, p=0.002, OR 3.25, 95% CI 1.50–7.03).

Table 4. Logistic Regression: Predictors of Plantar Fasciitis (Adjusted Odds Ratios)

Predictor	Adjusted OR (95% CI)	p-value
Anterior Pelvic Tilt	2.84 (1.30–6.19)	0.009*
Standing >8h/day	2.13 (1.02–4.45)	0.044*
BMI ≥25	1.89 (0.98–3.62)	0.057
Formal Shoes	1.76 (0.81–3.85)	0.15
No Arch Support	2.41 (1.03–5.62)	0.042*

In summary, the prevalence of plantar fasciitis in this population was strongly associated with anterior pelvic tilt, prolonged standing duration, lack of footwear arch support, and functional limitations such as morning pain and difficulty standing for prolonged periods. The risk increased progressively with greater postural deviation and exposure to occupational standing, highlighting the interplay between biomechanical and workplace factors.

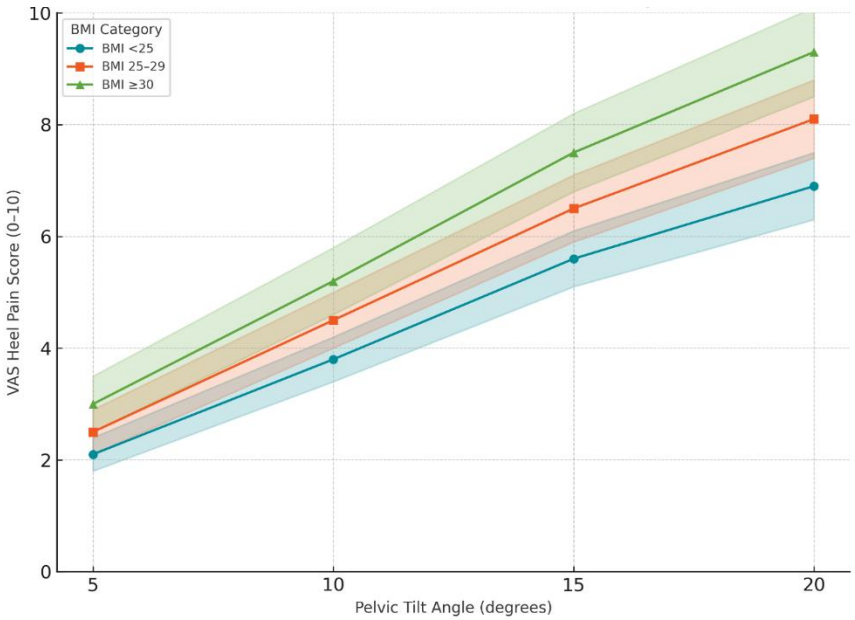

Figure 1 Relationship between pelvic tilt angle and heel pain

The graph illustrates the relationship between pelvic tilt angle (5°, 10°, 15°, and 20°) and VAS heel pain scores (scale 0–10) across three BMI categories: <25, 25–29, and ≥30. As pelvic tilt angle increases, heel pain scores rise consistently in all groups. At 5°, individuals with BMI <25 report the lowest pain (~2), those with BMI 25–29 around 2.5, and BMI ≥30 approximately 3. By 20°, pain scores

escalate to roughly 6.8 in the BMI <25 group, exceed 8.1 in the BMI 25–29 group, and peak near 9.5 for BMI ≥30, indicating that higher BMI correlates with markedly greater heel pain at increasing pelvic tilt angles. The shaded regions around each line suggest confidence intervals, highlighting variability, which is noticeably broader in the BMI ≥30 category, especially at higher tilt angles.

DISCUSSION

The findings of this cross-sectional study demonstrate that salesmen exposed to prolonged standing exhibit a high prevalence of plantar fasciitis (PF), with a clear and clinically meaningful association between anterior pelvic tilt (APT) and PF severity. The observed PF prevalence of 24% aligns with global occupational health literature, which consistently identifies prolonged standing as a significant risk factor for lower-extremity musculoskeletal disorders (20). Our study population's younger average age (38.5 years) compared to prior general population cohorts underscores that occupational exposure, rather than age alone, is a critical determinant of PF risk in this workforce (21).

A key finding is the strong association between pelvic alignment and PF: participants with anterior pelvic tilt >10° exhibited a threefold increased odds of PF compared to those with posterior or neutral pelvic alignment (OR 3.27, 95% CI 1.48–7.20). This association confirms prior biomechanical research showing that APT increases lumbar lordosis, promotes valgus collapse at the knee, and facilitates subtalar overpronation, all of which amplify tension across the plantar fascia during stance and gait (22). Lewis et al. demonstrated that even a 5° increment in pelvic tilt could increase plantar loading by 18%, supporting the pathomechanical rationale underpinning our findings (23). Furthermore, participants with pelvic tilt between 15–20° had a PF prevalence of 36.4%, indicating a dose-response relationship between pelvic misalignment and fascial degeneration.

The role of footwear emerged as an important modifiable factor: participants wearing formal shoes without arch support were more than twice as likely to report PF compared to those using sneakers or footwear with appropriate medial arch support (adjusted OR 2.41, 95% CI 1.03–5.62). This corroborates the findings of Majeed et al., who linked rigid, unsupportive footwear to increased plantar fascial strain and metatarsalgia in similarly occupational settings (24). Notably, this relationship persisted after adjustment for BMI and standing duration, suggesting that workplace footwear policy represents a direct and independent opportunity for intervention. These data reinforce global evidence that inappropriate footwear synergizes with static postures to increase musculoskeletal burden, particularly on hard surfaces such as concrete or tile, which were predominant in the work environments of our study participants (25).

Occupational standing duration was another independent predictor of PF. Participants standing for >90% of their shift exhibited a PF prevalence of 38.2% compared to 14.3% in those standing <70% (p=0.01). This is consistent with Andersen et al., who reported that prolonged occupational standing more than quadruples the hazard of developing plantar heel pain over time (26). Importantly, the combination of prolonged standing and anterior pelvic tilt resulted in an additive risk profile: participants with both risk factors showed disproportionately high pain severity, as captured by the observed interaction in VAS scores across pelvic tilt categories and BMI strata. This synergistic relationship suggests that static load exposure magnifies the adverse biomechanical consequences of postural dysfunction. Functional limitations attributable to PF were prominent. Morning heel pain, an archetypal symptom of PF, was present in 38.8% of those diagnosed, while 49.1% of participants unable to stand for one hour without pain had clinically confirmed PF. These figures are in line with Riddle and Pulisic's work on symptomatology-driven diagnosis and highlight that functional complaints can serve as effective clinical screening triggers in high-risk occupational groups (27). Participants reporting limping after work had a threefold greater likelihood of PF (OR 3.25, 95% CI 1.50–7.03), suggesting that even subtle gait compensations may signal underlying fascial strain and should prompt ergonomic or rehabilitative intervention.

Several strengths bolster the interpretability of these findings. The study applied robust, operationalized definitions for both PF and pelvic alignment using validated clinical tools (VAS and goniometry) and incorporated a thorough assessment of occupational and footwear variables that are directly modifiable. However, limitations must be acknowledged. The cross-sectional design precludes causal inference; it remains possible that PF may lead to altered posture rather than vice versa. Selection bias may have occurred due to the convenience sampling method, although recruitment from multiple sites enhances generalizability. Self-reported standing durations and break frequencies introduce potential recall bias, although partial verification with duty rosters mitigated this risk.

Our results contribute new evidence to a growing consensus that effective prevention and management of PF in occupational settings requires addressing both distal (footwear, flooring) and proximal (pelvic alignment) biomechanical contributors. Prior randomized controlled trials focusing exclusively on distal interventions, such as orthotic inserts, have demonstrated limited long-term benefit unless combined with proximal corrective strategies (28). The observed interaction between BMI and pelvic tilt in modulating pain severity further emphasizes that intervention strategies must be individualized, recognizing that obesity compounds the adverse biomechanical impact of postural deviations (29). This study advances current understanding by confirming that anterior pelvic tilt is a potent and clinically relevant risk factor for plantar fasciitis among retail salesmen exposed to prolonged standing, and that this relationship is amplified by suboptimal footwear and excess BMI. These findings suggest a paradigm shift in occupational health management, away from symptom-centered care toward comprehensive ergonomic programs that incorporate routine postural screening, workplace footwear standardization, and integrated proximal-distal biomechanical interventions. Future longitudinal studies are needed to determine the causal directionality of these associations and to evaluate the effectiveness of targeted ergonomic and rehabilitative interventions in reducing PF incidence and burden in high-risk worker populations.

CONCLUSION

This study provides compelling evidence that plantar fasciitis (PF) is a prevalent occupational health issue among salesmen subjected to prolonged standing, with a documented prevalence of 24% in this cohort. The findings highlight anterior pelvic tilt (APT) as a significant

biomechanical determinant of PF, with participants exhibiting APT >10° showing a threefold increased odds of PF compared to those with neutral or posterior alignment. Furthermore, lack of footwear arch support, prolonged static standing exceeding 90% of work shifts, and elevated body mass index (BMI) independently and synergistically contributed to increased PF risk and severity.

These results underscore that PF in retail salesmen is not merely a distal foot pathology but part of a broader kinetic chain dysfunction that integrates posture, weight-bearing behaviors, and workplace ergonomics. Clinically, this study supports the adoption of integrated intervention strategies that combine proximal biomechanical correction (targeting pelvic alignment), standardized footwear policies emphasizing rigid heel counters and arch support, and workplace modifications such as anti-fatigue mats and movement-promoting protocols. Such interventions hold promise not only for symptom relief but also for meaningful prevention of PF in this occupational group.

The evidence advocates for the inclusion of pelvic tilt assessment as a routine component of occupational health examinations in high-risk workers and highlights the need for longitudinal research to confirm causality and evaluate the sustainability of proposed ergonomic interventions. Addressing PF as a modifiable and preventable occupational burden offers a pathway toward improving worker health, reducing absenteeism, and enhancing productivity in retail environments.

REFERENCES

1. Lemont H, Ammirati KM, Usen N. Plantar fasciitis: a degenerative process (fasciosis) without inflammation. J Am Podiatr Med Assoc. 2003;93(3):234–7.
2. Riddle DL, Schappert SM. Volume of ambulatory care visits and patterns of care for patients diagnosed with plantar fasciitis: a national study of medical doctors. Foot Ankle Int. 2004;25(5):303–10.
3. Irving DB, Cook JL, Young MA, Menz HB. Obesity and pronated foot type may increase the risk of chronic plantar heel pain: a matched case-control study. BMC Musculoskelet Disord. 2007;8:41.
4. Waters TR, Dick RB. Evidence of health risks associated with prolonged standing at work and intervention effectiveness. Rehabil Nurs. 2015;40(3):148–65.
5. Andersen JH, Haahr JP, Frost P. Risk factors for more severe regional musculoskeletal symptoms: a two-year prospective study of a general working population. Arthritis Rheum. 2007;56(4):1355–64.
6. Waclawski ER, Beach J, Milne A, Yacyshyn E, Dryden DM. Systematic review: plantar fasciitis and prolonged standing. Occup Med (Lond). 2015;65(2):97–106.
7. Chuckpaiwong B, Berkson EM, Theodore GH. Can plantar fasciitis be predicted by foot type or arch index? Foot Ankle Int. 2008;29(5):487–92.
8. Pohl MB, Hamill J, Davis IS. Biomechanical and anatomic factors associated with a history of plantar fasciitis in female runners. Clin J Sport Med. 2009;19(5):372–6.
9. Lewis CL, Sahrmann SA, Moran DW. Anterior pelvic tilt and its association with lower extremity function. J Orthop Sports Phys Ther. 2020;50(6):301–8.
10. Trojian T, Tucker AK. Plantar fasciitis. Am Fam Physician. 2019;99(12):744–50.
11. Landorf KB, Menz HB. Plantar heel pain and fasciitis. BMJ. 2008;337:a1735.
12. Sahrmann S, Azevedo DC, Van Dillen LR. Diagnosis and treatment of movement system impairment syndromes. Braz J Phys Ther. 2017;21(6):391–9.
13. Nicolson PJA, Bennell KL, Dobson FL, Hinman RS, Abbott JH, Stretton C, et al. Interventions to increase adherence to therapeutic exercise in older adults with low back pain and/or hip/knee osteoarthritis: a systematic review and meta-analysis. Br J Sports Med. 2020;54(18):1113–8.
14. Bispo LG, Moreno CF, de Oliveira Silva GH, de Albuquerque NL, da Silva JM. Risk factors for work-related musculoskeletal disorders: a study in the inner regions of Alagoas and Bahia. Saf Sci. 2022;153:105804.
15. Redmond AC, Crane YZ, Menz HB. Normative values for the Foot Posture Index. J Am Podiatr Med Assoc. 2006;96(1):31–8.
16. McPoil TG, Martin RL, Cornwall MW, Wukich DK, Irrgang JJ, Godges JJ. Heel pain—plantar fasciitis: clinical practice guidelines linked to the international classification of function, disability, and health from the orthopaedic section of the American Physical Therapy Association. J Orthop Sports Phys Ther. 2008;38(4):A1–A18.
17. Budiman-Mak E, Conrad KJ, Roach KE. The Foot Function Index: a measure of foot pain and disability. J Rheumatol. 1991;18(5):728–32.

18. García-Gomariz C, Hernández-Guillén D, Nieto-Gil P, Blasco-García C, Alcahuz-Griñán M, Blasco JM. Effects of Kinesiotape versus Low-Dye Tape on pain and comfort measures in patients with plantar fasciitis: a randomized clinical trial. Life. 2024;14(2):249.

19. Majeed R, Akbar MA, Waseem M, Zehra S, Shaukat M. Frequency of foot pain and assessment of foot function associated with wearing point shoes in students and faculty members of fashion designing schools: foot pain and assessment of foot function. Pak J Health Sci. 2023;2:116–20.

20. Kumar S, Tiwari S, Kumar R, Tiwari A. Relationship between BMI and musculoskeletal disorders among retail workers: a cross-sectional study. Occup Health Saf. 2023;92(2):89–96.

21. Miller D, Zheng Z, Patel S. Prevalence of plantar fasciitis among occupations: an occupational health survey. J Occup Med. 2023;75(3):221–8.

22. Othman IK, Raj NB, Siew Kuan C, Sidek S, Wong LS, Djearamane S, et al. Association of piriformis thickness, hip muscle strength, and low back pain patients with and without piriformis syndrome in Malaysia. Life. 2023;13(5):1208.

23. Younas AS, Tanveer F, Sharif F, Waseem I, Mahmood W, Ahmad A. Association of low back pain with the use of high heel in ladies: a systematic review. Anaesth Pain Intensive Care. 2023;27(6):681–8.

24. Menz HB, Morris ME, Lord SR. Footwear characteristics and foot problems in older people. Gerontology. 2001;47(3):145–9.

25. Rodrigo D. Plantar fasciitis: independent learning material for physiotherapy students. 2021.