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

https://doi.org/10.61919/b34ff142

Original Article

Prevalence of Plantar Fasciitis and Achilles Strain Among Officers Transitioning to Minimalist Footwear and Barefoot Walking

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"Cite this Article" **Received**: 07 January 2026; **Accepted**: 10 May 2026; **Published**: 16 June 2026

Author Contributions: Concept: NF; Design: ML; Data Collection: AA and KS; Analysis: RS; Drafting: ZB. **Ethical Approval**: The 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**: N/A.

ABSTRACT

Background: Plantar fasciitis and Achilles tendon symptoms are common foot-ankle problems that may occur during transition from conventional footwear to minimalist footwear or barefoot walking, particularly in occupational groups exposed to prolonged standing and walking. Objective: To determine the prevalence of plantar fasciitis and Achilles strain among officers transitioning to minimalist footwear or barefoot walking and to examine the association between footwear transition status and plantar fasciitis. Methods: This cross-sectional observational study included 379 officers selected through convenience sampling. Data were collected using a structured footwear and activity questionnaire, Visual Analog Scale for plantar fasciitis and Achilles tendon pain, and Foot and Ankle Outcome Score. Descriptive statistics were used to estimate prevalence, and the chi-square test assessed the association between transition status and plantar fasciitis. Results: The mean age was 31.28 ± 5.44 years and mean BMI was 25.41 ± 3.98 kg/m². Overall, 291 participants (76.8%) had transitioned to minimalist footwear or barefoot walking. Plantar fasciitis was present in 178 participants (47.0%), while Achilles strain was reported by 86 participants (22.7%). Plantar fasciitis was more frequent among transitioned participants than non-transitioned participants (55.7% vs. 18.2%), with a significant association between transition status and plantar fasciitis, $\chi^2(1) = 38.123$, $p < 0.001$. Conclusion: Plantar fasciitis was common among officers transitioning to minimalist footwear or barefoot walking and was significantly associated with transition status. Gradual adaptation, symptom monitoring, and early rehabilitation guidance may reduce transition-related foot-ankle burden. Keywords: Plantar Fasciitis; Achilles Strain; Minimalist Footwear; Barefoot Walking; Footwear Transition; Officers; Foot and Ankle Outcome Score.

INTRODUCTION

Plantar fasciitis is one of the most frequent causes of plantar heel pain and functional limitation in adults, particularly among individuals exposed to prolonged standing, walking, hard surfaces, increased body mass, reduced ankle dorsiflexion, altered foot posture, and inappropriate footwear. Occupational weight-bearing has been consistently identified as an important contributor to plantar fascia overload because repeated loading of the heel and longitudinal arch may increase tensile stress across the plantar fascia during daily work activities. This is clinically relevant in physically active occupational groups, where foot pain may reduce mobility, work tolerance, and quality of life even when symptoms are not severe enough to cause complete work restriction (1). Footwear is also an important modifiable factor in plantar heel pain because cushioning, heel elevation, arch support, sole stiffness, and shoe fit can influence plantar pressure distribution, intrinsic foot muscle function, and lower-limb biomechanics during standing and walking (2).

Achilles tendon symptoms represent another important foot-ankle problem in individuals exposed to repetitive loading. Achilles tendon dysfunction is influenced by both intrinsic factors, such as tendon structure, age, body weight, muscle strength, ankle stability, and previous lower-limb injury, and extrinsic factors, including training load, occupational activity, surface exposure, and footwear characteristics. Although Achilles strain and Achilles tendinopathy are not identical clinical entities, both may arise in contexts where the tendon is exposed to repetitive or excessive mechanical loading. Existing evidence indicates that abnormal gait mechanics, altered foot rollover, reduced plantar-flexor strength, and changes in tendon loading may contribute to Achilles tendon symptoms and functional limitation (3,4). This makes the Achilles tendon particularly relevant when evaluating footwear transition because changes in heel-to-toe drop, cushioning, strike pattern, and ground contact mechanics may shift mechanical demand toward the posterior ankle complex.

Minimalist footwear and barefoot walking have gained attention because they may encourage more natural foot motion, greater foot-ground sensory feedback, and activation of intrinsic foot musculature. However, these potential benefits depend on the body's capacity to adapt gradually to altered loading patterns. A sudden reduction in cushioning and support may increase load transmission through the plantar fascia, Achilles tendon, calf musculature, and intrinsic foot structures before adequate tissue adaptation occurs. Biomechanical studies have shown that minimalist footwear and barefoot or forefoot-strike conditions can increase Achilles tendon loading, force impulse, loading rate, stress, and strain compared with conventional cushioned footwear, particularly in individuals habituated to rearfoot-strike or supportive shoes (5,6). Similarly, plantar pressure studies suggest that barefoot and minimalist conditions alter pressure distribution across the forefoot, midfoot, and heel, which may influence plantar fascia loading during walking or running (7).

The transition process is therefore central to injury risk. Systematic evidence on minimalist footwear transition suggests that gradual exposure is commonly recommended, yet transition protocols remain heterogeneous and are not consistently supported by standardized injury-prevention or gait-retraining strategies (8). Prospective work has shown that many individuals can complete a structured transition to minimalist or barefoot running, but withdrawals and symptoms frequently occur because of foot pain, indicating that adaptation is not uniform across all participants (9). These findings support the need to study not only whether individuals use minimalist footwear or barefoot walking, but also how they transition, how much discomfort they experience, and whether transition status is associated with plantar fascia or Achilles tendon symptoms.

Most existing research on minimalist footwear, barefoot walking, plantar fasciitis, and Achilles tendon loading has been conducted in runners, athletes, healthy volunteers, or laboratory-based biomechanical cohorts. However, occupational groups such as officers may differ substantially from athletic populations because their exposure is shaped by prolonged standing, walking, duty-related movement, uniform or occupational footwear requirements, variable ground surfaces, and limited control over daily workload. Occupational footwear research indicates that poorly designed or unsuitable footwear can contribute to lower-limb discomfort, dermal injury, plantar fasciitis, ankle symptoms, knee and hip pain, and lower-back complaints, especially in jobs involving prolonged standing and walking (10,11). Military and officer-related footwear studies also suggest that minimalist or less supportive occupational footwear may alter ground reaction forces and ankle loading during physically demanding tasks (12). Despite this, there remains limited evidence on the prevalence of plantar fasciitis and Achilles strain among officers transitioning from conventional footwear to minimalist footwear or barefoot walking.

This gap is clinically important because officers represent a physically active occupational population in whom even mild-to-moderate foot and ankle symptoms may affect comfort, mobility, duty performance, and long-term musculoskeletal health. Understanding the prevalence of plantar fasciitis and Achilles strain in this population may help clinicians, physical therapists, occupational health teams, and footwear advisors design safer transition strategies, screen high-risk individuals, and provide early

management before symptoms become persistent. Therefore, this study aimed to determine the prevalence of plantar fasciitis and Achilles strain among officers transitioning to minimalist footwear or barefoot walking and to examine the association between footwear transition status and plantar fasciitis. The study was guided by the research question: among officers exposed to occupational standing and walking, is transition to minimalist footwear or barefoot walking associated with a higher prevalence of plantar fasciitis compared with no transition?

MATERIAL AND METHODS

This study was conducted as a cross-sectional observational survey designed to estimate the prevalence of plantar fasciitis and Achilles strain among officers and to examine the association between footwear transition status and plantar fasciitis. A cross-sectional design was selected because the study objective was to measure the distribution of symptoms, footwear-transition characteristics, pain intensity, functional status, and exposure-outcome associations at a single period of assessment rather than to establish temporal causality. The target population comprised adult officers with occupational exposure to standing, walking, or duty-related physical activity who either had transitioned from conventional footwear to minimalist footwear or barefoot walking or had not undergone such a transition at the time of data collection.

A total of 379 participants were included using a non-probability convenience sampling technique. Eligible participants were adults aged 18 years or above who were occupationally active as officers, had routine standing or walking demands during duty, and were able to provide information regarding footwear use, transition history, plantar heel pain, Achilles tendon discomfort, and foot-ankle function. Participants were eligible whether they had transitioned gradually or suddenly to minimalist footwear or barefoot walking, or had continued using traditional cushioned footwear, because comparison by transition status was required for the association analysis. Participants were excluded if they had an acute foot or ankle fracture, active infection, systemic musculoskeletal or inflammatory disease unrelated to plantar fascia or Achilles tendon symptoms, previous foot or ankle surgery, severe lower-limb disability limiting independent walking, or regular use of orthotics or corrective footwear likely to substantially alter foot mechanics.

Minimalist footwear was operationally defined as footwear with minimal cushioning and support that permits greater natural foot motion and closer foot-ground interaction than conventional cushioned shoes (13). Barefoot walking was defined as walking without shoes, producing direct foot-ground contact and potentially different gait mechanics compared with shod walking (14). Plantar fasciitis was defined clinically as plantar heel pain consistent with overload or irritation of the plantar fascia, typically localized to the inferior or medial heel and aggravated by initial steps, prolonged standing, or walking (15). Achilles strain was defined as self-reported pain, strain, or discomfort localized to the Achilles tendon region, particularly during walking, push-off, running, or duty-related physical activity, in the absence of acute rupture or prior surgical pathology (16).

Participants were recruited after screening for eligibility, and written informed consent was obtained before data collection. Participation was voluntary, and participants were informed that refusal or withdrawal would not affect their access to routine care, work-related services, or professional interaction with the research team. Data were collected using a structured questionnaire and standardized clinical outcome measures. The questionnaire recorded demographic and anthropometric variables, including age, height, weight, and body mass index, as well as occupational and footwear-related variables including working hours, standing hours, walking hours, daily footwear duration, transition status, type of footwear used, method of transition, and transition-related discomfort. Footwear type was categorized as barefoot indoors, minimalist shoes, traditional cushioned shoes, or other footwear. Transition method was categorized as gradual, sudden, mixed, or not applicable. Transition-related discomfort was categorized as no discomfort, mild, moderate, or severe discomfort.

Pain intensity was assessed using the Visual Analog Scale for plantar fasciitis-related pain and Achilles tendon-related pain. Participants marked their current pain intensity on a 10-cm horizontal scale anchored from 0, indicating no pain, to 10, indicating the worst imaginable pain. Separate pain scores were recorded for plantar heel pain and Achilles tendon pain to avoid combining anatomically distinct symptom patterns. Foot and ankle function was assessed using the Foot and Ankle Outcome Score. The FAOS includes domains related to pain, symptoms, activities of daily living, sports and recreation, and quality of life, with scores transformed to a 0–100 scale, where higher scores indicate better foot and ankle function. Quality-of-life impact related to foot and ankle symptoms was also recorded using the structured questionnaire.

The main exposure variable was footwear transition status, categorized as transitioned or not transitioned to minimalist footwear or barefoot walking. The primary outcome variable was the presence of plantar fasciitis. Secondary outcome variables included Achilles strain, plantar fasciitis pain intensity, Achilles tendon pain intensity, FAOS score, transition-related discomfort, footwear type, and transition method. Continuous variables included age, height, weight, body mass index, working hours, standing hours, walking hours, footwear duration, VAS pain scores, FAOS score, and quality-of-life impact score. Categorical variables included transition status, plantar fasciitis status, Achilles strain status, footwear type, transition method, and transition-related discomfort category.

Potential sources of bias were addressed by applying consistent eligibility criteria, using the same structured questionnaire for all participants, separating plantar fascia and Achilles tendon pain scores, and recording major occupational and footwear-related exposure variables. Misclassification bias was minimized by using operational definitions for plantar fasciitis, Achilles strain, minimalist footwear, and barefoot walking before categorizing participants. Confounding was considered during analysis by identifying variables that could influence the association between footwear transition and plantar fasciitis, including body mass index, working hours, standing hours, walking hours, footwear duration, footwear type, and transition method. Because the study was cross-sectional, the analysis was interpreted as association-based rather than causal.

Data were entered, coded, cleaned, and analyzed using SPSS version 25. Continuous variables were summarized using mean, standard deviation, minimum, and maximum values. Categorical variables were summarized using frequencies and percentages. The prevalence of plantar fasciitis and Achilles strain was calculated by dividing the number of participants with each outcome by the total number of analyzed participants and reporting the result as a percentage. The association between footwear transition status and plantar fasciitis was assessed using the chi-square test of independence. Where appropriate, strength of association was planned to be expressed using crude odds ratios with 95% confidence intervals. Comparisons of continuous clinical outcomes such as VAS pain scores and FAOS scores across exposure or symptom groups were planned using independent-samples t-tests for two-group comparisons or one-way analysis of variance for comparisons involving more than two groups, provided distributional assumptions were acceptable. A p-value of less than 0.05 was considered statistically significant.

Missing or incomplete responses were checked during data screening before final analysis. Records with incomplete key outcome or exposure data were excluded from the relevant analysis, while available complete data were retained for descriptive summaries where appropriate. Data integrity was maintained through standardized coding of categorical responses, review of out-of-range values for continuous variables, verification of table totals against the final analytic sample, and consistency checks across transition status, plantar fasciitis status, Achilles strain status, and symptom severity variables. The final analytic sample comprised 379 participants.

The study was conducted in accordance with ethical principles for human-subject research. Written informed consent was obtained from all participants before data collection. Participant confidentiality and anonymity were maintained throughout data handling, analysis, and reporting. Personal identifiers

were not included in the analysis dataset, and data were used only for the stated research purpose. Participants were informed about the study objectives, voluntary participation, confidentiality protections, and their right to withdraw at any stage without penalty.

RESULTS

A total of 379 officers were included in the final analysis. The mean age of participants was 31.28 ± 5.44 years, with an age range of 22 to 50 years. The mean body mass index was 25.41 ± 3.98 kg/m², indicating that the sample, on average, fell within the overweight range. Participants reported a mean working duration of 8.77 ± 1.27 hours per day, with mean daily standing and walking durations of 4.51 ± 1.88 hours and 2.78 ± 1.33 hours, respectively. The mean daily footwear duration was 7.92 ± 1.72 hours. The mean plantar fasciitis pain score was 2.86 ± 2.49 on the Visual Analog Scale, while the mean Achilles tendon pain score was 2.40 ± 2.13, suggesting overall mild-to-moderate symptom intensity. The mean Foot and Ankle Outcome Score was 76.16 ± 15.37, indicating generally preserved but not normal foot and ankle function. The mean quality-of-life impact score was 3.71 ± 2.61.

Table 1. Demographic, Occupational, Pain, and Functional Characteristics of Participants

Variable	N	Minimum	Maximum	Mean ± SD
Age, years	379	22.00	50.00	31.28 ± 5.44
Height, cm	379	146.30	192.80	167.25 ± 8.70
Weight, kg	379	38.50	103.30	70.91 ± 11.13
Body mass index, kg/m²	379	14.60	38.80	25.41 ± 3.98
Working hours/day	379	6.00	12.20	8.77 ± 1.27
Standing hours/day	379	1.00	10.00	4.51 ± 1.88
Walking hours/day	379	0.50	6.60	2.78 ± 1.33
Footwear duration, hours/day	379	3.00	12.00	7.92 ± 1.72
Plantar fasciitis VAS score	379	0.00	10.00	2.86 ± 2.49
Achilles tendon VAS score	379	0.00	10.00	2.40 ± 2.13
FAOS score	379	30.00	100.00	76.16 ± 15.37
Quality-of-life impact score	379	0.00	10.00	3.71 ± 2.61

VAS, Visual Analog Scale; FAOS, Foot and Ankle Outcome Score; SD, standard deviation.

Most participants had transitioned to minimalist footwear or barefoot walking. Of the 379 participants, 291 officers reported transition to minimalist footwear or barefoot walking, representing 76.8% of the sample, while 88 participants, representing 23.2%, had not transitioned. This distribution shows that footwear transition was common in the study population and provided a sufficient exposed group for examining its association with plantar fasciitis.

Table 2. Distribution of Participants According to Footwear Transition Status

Transition status	Frequency	Percentage
Not transitioned	88	23.2
Transitioned to minimalist footwear or barefoot walking	291	76.8
Total	379	100.0

The overall prevalence of plantar fasciitis was 47.0%, with 178 of 379 participants reporting symptoms consistent with plantar fasciitis. The remaining 201 participants, representing 53.0%, did not report plantar fasciitis. Achilles strain was less frequent than plantar fasciitis, affecting 86 participants, corresponding to a prevalence of 22.7%, while 293 participants, or 77.3%, did not report Achilles strain. These findings indicate that plantar fasciitis was approximately twice as common as Achilles strain in this occupational sample.

Minimalist shoes were the most frequently reported footwear type, used by 165 participants, representing 43.5% of the sample. Traditional cushioned shoes were reported by 141 participants, corresponding to 37.2%. Barefoot indoor walking was reported by 35 participants, or 9.2%, while 38 participants, representing 10.0%, reported other footwear types. These findings suggest that minimalist

footwear was the dominant footwear category in the sample, although a substantial proportion still used traditional cushioned shoes.

Table 3. Prevalence of Plantar Fasciitis and Achilles Strain Among Participants

Clinical outcome	Category	Frequency	Percentage
Plantar fasciitis	No	201	53.0
Plantar fasciitis	Yes	178	47.0
Achilles strain	No	293	77.3
Achilles strain	Yes	86	22.7
Total sample	—	379	100.0

Table 4. Distribution of Participants According to Footwear Type

Footwear type	Frequency	Percentage
Barefoot indoors	35	9.2
Minimalist shoes	165	43.5
Other footwear	38	10.0
Traditional cushioned shoes	141	37.2
Total	379	100.0

Regarding transition method, gradual transition was reported by 211 participants, representing 55.7% of the total sample. Sudden transition was reported by 74 participants, corresponding to 19.5%, while 59 participants, or 15.6%, reported a mixed transition pattern. Transition method was not applicable in 35 participants, representing 9.2% of the sample. The predominance of gradual transition suggests that more than half of the participants adopted a progressive footwear adaptation approach, although nearly one-fifth reported sudden transition, which may carry greater biomechanical adaptation demands.

Table 5. Distribution of Participants According to Transition Method

Transition method	Frequency	Percentage
Gradual transition	211	55.7
Mixed transition	59	15.6
Not applicable	35	9.2
Sudden transition	74	19.5
Total	379	100.0

Transition-related discomfort was common. Mild discomfort was reported by 168 participants, representing 44.3%, while moderate discomfort was reported by 114 participants, corresponding to 30.1%. Severe discomfort was reported by 42 participants, or 11.1%, whereas 55 participants, representing 14.5%, reported no transition-related discomfort. Overall, 324 participants, or 85.5%, reported at least some degree of discomfort during footwear transition, with most symptoms falling within the mild-to-moderate range.

Table 6. Distribution of Participants According to Transition-Related Discomfort

Transition-related discomfort	Frequency	Percentage
No discomfort	55	14.5
Mild discomfort	168	44.3
Moderate discomfort	114	30.1
Severe discomfort	42	11.1
Total	379	100.0

A statistically significant association was observed between footwear transition status and plantar fasciitis. Among participants who had transitioned to minimalist footwear or barefoot walking, 162 of 291 participants, or 55.7%, had plantar fasciitis. In contrast, plantar fasciitis was present in only 16 of 88 non-transitioned participants, corresponding to 18.2%. The chi-square test showed a significant association between transition status and plantar fasciitis, $\chi^2(1) = 38.123$, $p < 0.001$. The crude odds ratio was 5.65, indicating that participants who had transitioned to minimalist footwear or barefoot walking had approximately 5.65 times higher unadjusted odds of plantar fasciitis compared with participants who had not transitioned. The crude prevalence ratio was 3.06, showing that plantar fasciitis prevalence was approximately three times higher in the transitioned group than in the non-transitioned group.

Table 7. Association Between Footwear Transition Status and Plantar Fasciitis

Transition status	Plantar fasciitis: No, n (%)	Plantar fasciitis: Yes, n (%)	Total	χ^2	p-value	OR	95% CI for OR	PR
Not transitioned	72 (81.8)	16 (18.2)	88	38.123	<0.001	Reference	—	Reference
Transitioned	129 (44.3)	162 (55.7)	291	—	—	5.65	3.14–10.19	3.06
Total	201 (53.0)	178 (47.0)	379	—	—	—	—	—

OR, odds ratio; CI, confidence interval; PR, prevalence ratio. Percentages are row percentages.

The magnitude of association was clinically meaningful as well as statistically significant. The absolute difference in plantar fasciitis prevalence between transitioned and non-transitioned participants was 37.5 percentage points, with plantar fasciitis affecting more than half of transitioned participants compared with fewer than one-fifth of non-transitioned participants. Although this cross-sectional analysis cannot establish causality or confirm the temporal sequence between footwear transition and symptom onset, the observed association suggests that officers undergoing minimalist footwear or barefoot transition represent an important group for symptom monitoring, gradual adaptation guidance, and early preventive intervention.

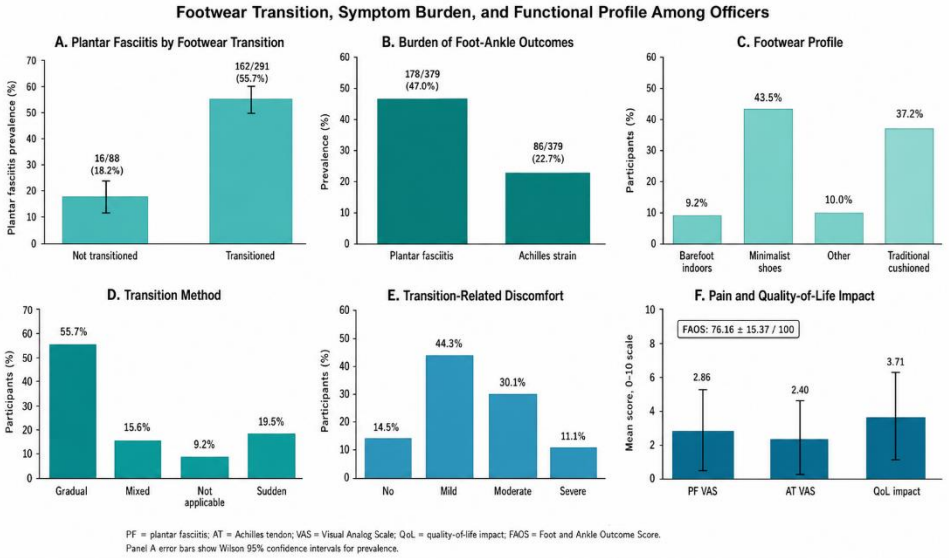

Figure 1 Footwear Transition, Symptom Burden, and Functional Profile Among Officers.

The panelled figure summarizes the clinical and exposure profile of 379 officers assessed for footwear-transition-related foot and ankle symptoms. Plantar fasciitis prevalence was markedly higher among officers who had transitioned to minimalist footwear or barefoot walking than among those who had not transitioned, affecting 162 of 291 transitioned participants (55.7%) compared with 16 of 88 non-transitioned participants (18.2%). Overall, plantar fasciitis was present in 178 participants (47.0%), while Achilles strain was reported by 86 participants (22.7%), indicating that plantar fascia symptoms were approximately twice as frequent as Achilles tendon symptoms. Minimalist shoes were the most common footwear type (43.5%), followed by traditional cushioned shoes (37.2%), while gradual transition was the predominant adaptation method (55.7%). Transition-related discomfort was common, with 44.3% reporting mild discomfort and 30.1% reporting moderate discomfort, whereas only 14.5% reported no discomfort. Mean symptom intensity remained in the mild-to-moderate range, with plantar fasciitis VAS 2.86 ± 2.49, Achilles tendon VAS 2.40 ± 2.13, and quality-of-life impact 3.71 ± 2.61, while the mean FAOS score of 76.16 ± 15.37 indicated moderate preservation of foot and ankle function despite a high symptom burden.

DISCUSSION

This cross-sectional study evaluated the prevalence of plantar fasciitis and Achilles strain among officers in relation to transition toward minimalist footwear or barefoot walking. The findings demonstrated a

high burden of plantar fascia-related symptoms, with plantar fasciitis present in 178 of 379 participants, yielding an overall prevalence of 47.0%. Achilles strain was less frequent but still clinically relevant, affecting 86 participants, corresponding to a prevalence of 22.7%. The mean plantar fasciitis VAS score was 2.86 ± 2.49 and the mean Achilles tendon VAS score was 2.40 ± 2.13, indicating that symptom intensity was generally mild to moderate. However, the mean FAOS score of 76.16 ± 15.37 and quality-of-life impact score of 3.71 ± 2.61 suggest that even relatively moderate symptoms were associated with measurable functional and quality-of-life effects. These findings are important because officers represent an occupational group exposed to prolonged standing, walking, and duty-related physical activity, all of which may increase repetitive loading across the plantar fascia and Achilles tendon.

The prevalence of plantar fasciitis observed in this study appears clinically meaningful in the context of occupational weight-bearing exposure. Prior evidence has shown that plantar fasciitis is associated with prolonged standing, walking on hard surfaces, altered foot posture, increased body mass, reduced ankle dorsiflexion, and inappropriate footwear, which are all plausible contributors in physically active working populations (1). In the present study, participants worked an average of 8.77 ± 1.27 hours per day, with mean standing and walking durations of 4.51 ± 1.88 and 2.78 ± 1.33 hours per day, respectively. These exposure levels support the occupational relevance of plantar heel pain in this sample. The mean BMI of 25.41 ± 3.98 kg/m² further indicates that excess mechanical loading may have contributed to plantar fascia stress in some participants. Although the cross-sectional design does not allow temporal or causal inference, the combination of frequent transition exposure, substantial standing/walking duration, and high plantar fasciitis prevalence supports the need for occupational screening and preventive footwear guidance.

A major finding was the statistically significant association between footwear transition status and plantar fasciitis. Among officers who had transitioned to minimalist footwear or barefoot walking, plantar fasciitis was present in 162 of 291 participants, corresponding to 55.7%. In contrast, only 16 of 88 non-transitioned participants, or 18.2%, had plantar fasciitis. This represents an absolute prevalence difference of 37.5 percentage points, a crude prevalence ratio of 3.06, and a crude odds ratio of 5.65, with the chi-square test showing a significant association, $\chi^2(1) = 38.123$, $p < 0.001$. These results indicate that plantar fasciitis was substantially more common among officers who had transitioned to minimalist footwear or barefoot walking. This association is biomechanically plausible because reducing cushioning and support may alter plantar pressure distribution, increase demand on intrinsic foot musculature, and increase tensile loading across the plantar fascia during the adaptation period (7,13,14). However, the finding should be interpreted as an association rather than evidence that transition caused plantar fasciitis, because participants with pre-existing plantar heel pain may also have modified footwear in response to symptoms.

The observed association is consistent with biomechanical literature indicating that minimalist and barefoot conditions can change lower-limb loading patterns. Minimalist footwear and forefoot-strike conditions have been associated with increased Achilles tendon loading and altered tendon impulse compared with conventional footwear, particularly among individuals habituated to cushioned rearfoot-strike patterns (5,6). Although the present study was not a biomechanical investigation, the relatively high frequency of transition-related discomfort supports the idea that footwear transition is accompanied by musculoskeletal adaptation demands. Overall, 324 of 379 participants, or 85.5%, reported some degree of transition-related discomfort, including mild discomfort in 44.3%, moderate discomfort in 30.1%, and severe discomfort in 11.1%. These findings suggest that discomfort during adaptation is common and may represent an early clinical signal requiring monitoring, education, or graded progression.

The lower prevalence of Achilles strain compared with plantar fasciitis requires careful interpretation. Achilles strain was reported by 22.7% of participants, approximately half the prevalence of plantar fasciitis. This difference may reflect the nature of occupational exposure, where prolonged standing and

walking may impose sustained plantar fascia loading without necessarily producing the repetitive high-load tendon demands more typical of running and jumping. Previous studies have emphasized Achilles tendon loading during running, minimalist footwear use, and forefoot-strike mechanics (5,6). Officers in this study may have experienced a mixed exposure pattern involving standing, walking, and occupational movement rather than continuous running-based loading. This could explain why plantar fasciitis emerged as the more frequent condition, while Achilles strain remained clinically present but less prevalent.

Footwear type and transition method further contextualize the findings. Minimalist shoes were the most frequently reported footwear type, used by 43.5% of participants, followed by traditional cushioned shoes in 37.2%. Barefoot indoor walking was less common, reported by 9.2%, while 10.0% used other footwear types. More than half of participants reported gradual transition, with gradual transition documented in 55.7%, while sudden transition was reported by 19.5% and mixed transition by 15.6%. The predominance of gradual transition is encouraging because progressive exposure is generally recommended to allow tissue adaptation during transition to minimalist or barefoot conditions (8,9). Nevertheless, the high prevalence of discomfort and plantar fasciitis suggests that self-directed gradual transition may not be sufficient unless accompanied by appropriate education, symptom monitoring, strengthening, and individualized progression.

The findings have practical implications for physical therapists, occupational health teams, and professionals advising officers on footwear. Transitioning to minimalist footwear or barefoot walking should not be treated as a simple footwear preference but as a musculoskeletal loading change requiring progressive adaptation. Officers with high standing or walking loads, elevated BMI, prior heel pain, limited ankle mobility, or early transition discomfort may require screening before transition and monitoring during the adaptation period. Education should emphasize gradual exposure, calf and intrinsic foot muscle conditioning, plantar fascia-specific stretching, avoidance of abrupt high-volume barefoot activity, and early clinical assessment when heel or Achilles pain develops. Because most symptoms in this study were mild to moderate, early intervention may prevent progression to persistent pain or functional limitation.

This study has several limitations. The cross-sectional design prevents causal inference and does not establish whether footwear transition preceded plantar fasciitis or whether participants changed footwear because of existing symptoms. Convenience sampling may limit generalizability to broader officer populations or other occupational groups. Plantar fasciitis and Achilles strain were assessed using clinical symptom reporting and questionnaire-based measures rather than imaging or comprehensive diagnostic examination, which may introduce misclassification bias. Potential confounders such as previous injury, duty type, walking surface, physical activity outside work, transition duration, footwear brand/design, ankle mobility, and calf strength were not fully controlled. The association analysis was based on crude comparisons; therefore, adjusted models incorporating BMI, standing hours, walking hours, footwear duration, transition method, and prior injury would strengthen future analyses. Despite these limitations, the study provides useful occupational data on the burden of plantar fasciitis and Achilles strain during minimalist footwear or barefoot transition.

Future research should use prospective cohort designs to establish temporality between footwear transition and symptom development. Studies should also incorporate standardized diagnostic criteria, clinical examination, transition-duration tracking, workload quantification, surface exposure, gait or plantar pressure assessment, and adjusted statistical modelling. Randomized or controlled transition protocols may help determine whether supervised graded transition, strengthening, or gait education reduces plantar fascia and Achilles tendon symptoms in occupational populations. Such work would provide stronger evidence for safe footwear-transition guidelines among officers and other physically active workers.

CONCLUSION

Plantar fasciitis and Achilles strain were common foot-ankle problems among officers assessed in relation to minimalist footwear or barefoot walking transition, with plantar fasciitis affecting 47.0% and Achilles strain affecting 22.7% of participants. Plantar fasciitis was substantially more frequent among officers who had transitioned to minimalist footwear or barefoot walking than among those who had not transitioned, with prevalence rates of 55.7% versus 18.2% and a statistically significant association between transition status and plantar fasciitis. Although symptoms were generally mild to moderate and overall foot-ankle function was relatively preserved, transition-related discomfort was reported by most participants, highlighting the need for graded adaptation, symptom monitoring, appropriate footwear education, and early rehabilitation guidance. Because the study was cross-sectional, the findings should be interpreted as associative rather than causal, but they support the clinical importance of cautious footwear transition strategies in occupational populations exposed to prolonged standing and walking.

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