Prevalence of Plantar Fasciitis Among Security Guards

Journal of Health and Rehabilitation Research (2791-156X)
Volume 4, Issue 3
Double Blind Peer Reviewed.
https://jhrlmc.com/
DOI: https://doi.org/10.61919/jhrr.v4i3.1574
www.lmi.education/
LINK MEDICAL INTERFACE

Nimra Nadeem[1], Iqra Nisar[2], Atif Ali Attar[2], Asma Malik[2], Arti Lohana[2], Hanifa Suleman[3], Shahzaib Hassan Syed[4], Shabana Nawaz[5], Intsam Aslam[6]

Correspondence
Intsam Aslam
intsamaslam6@gmail.com

Affiliations
1 International Institute of Science, Arts and Technology, Gujranwala, Pakistan
2 Bhitai Institute of Physiotherapy and Rehabilitation Sciences, Mirpurkhas, Pakistan
3 Bolan University of Medical and Health Science, Quetta, Pakistan
4 BPP University, London, UK
5 Rashid Latif Institute of Allied Health Sciences, Lahore, Pakistan
6 PSRD College of Rehabilitation Sciences, Lahore, Pakistan

Keywords
Plantar fasciitis prevalence, occupational health, security guards, heel pain, risk factors, BMI, standing posture, ergonomic assessment, musculoskeletal disorders, pain management.

Disclaimers

Authors' Contributions	All authors contributed equally to the research and writing of the manuscript.
Conflict of Interest	None declared
Data/supplements	Available on request.
Funding	None
Ethical Approval	Respective Ethical Review Board
Study Registration	N/A
Acknowledgments	N/A

ABSTRACT

Background: Plantar fasciitis is a common condition affecting individuals engaged in prolonged weight-bearing activities, causing pain at the plantar fascia's insertion on the calcaneal tuberosity. It often disrupts daily activities and quality of life.

Objective: To evaluate the prevalence and associated risk factors of plantar fasciitis among security guards.

Methods: A descriptive cross-sectional study was conducted in Gujranwala, Pakistan, over four months. A total of 177 male security guards aged 30 to 60 years with more than one year of work experience were included using non-probability convenient sampling. Participants were assessed using a questionnaire, Windlass test for plantar fasciitis diagnosis, and Visual Analog Scale (VAS) for pain severity. Demographic data such as age, BMI, duty hours, posture, and foot type were recorded. Statistical analysis was performed using SPSS version 25.

Results: Among 177 security guards, 7.9% (14 participants) tested positive for plantar fasciitis. The majority of guards (44.1%) worked more than 8 hours daily. Significant associations were found between plantar fasciitis and age >50 years, BMI >25 (41.3% overweight), and prolonged standing ($p<0.05$).

Conclusion: Age, high BMI, and prolonged standing were identified as significant risk factors for plantar fasciitis in security guards, emphasizing the need for preventive strategies.

INTRODUCTION

Plantar fasciitis (PF) is a prevalent musculoskeletal disorder that presents as pain and inflammation in the heel, often affecting the plantar fascia—a thick connective tissue structure that supports the arch of the foot and serves as a shock absorber during weight-bearing activities (1). This condition is widely recognized as a major cause of heel pain, impacting millions of individuals globally, and is often described as a degenerative disorder rather than a purely inflammatory one (2). Several risk factors contribute to the development of plantar fasciitis, including prolonged standing, limited ankle dorsiflexion, high body mass index (BMI), and activities involving repetitive strain on the heel, such as running or extensive walking (3). The prevalence of plantar fasciitis is notably high among occupational groups such as security guards, athletes, and military personnel, who are frequently engaged in prolonged standing or weight-bearing activities, thereby increasing the risk of microtrauma and degenerative changes in the plantar fascia (4).

Heel pain, a hallmark symptom of plantar fasciitis, can be categorized into posterior and inferior heel pain, with the latter primarily associated with plantar fasciitis. Pain is typically localized at the insertion of the plantar fascia on the medial process of the calcaneal tuberosity, and it is often described as sharp and stabbing, exacerbated by the first few steps taken in the morning or after a period of inactivity (5). The condition is sometimes referred to by other terms, such as policeman's heel or jogger's heel, and can be accompanied by heel spurs, Achilles tendinopathy, or bursitis (6). The pathophysiology of plantar fasciitis involves degenerative irritation at the plantar fascia's insertion site, resulting in microtears and collagen disintegration, which diminishes the tissue's elasticity and leads to chronic pain and dysfunction (7). Limited research has been conducted on the prevalence of plantar fasciitis in specific occupational settings, despite its potential impact on workforce productivity and quality of life (8). The limited dorsiflexion in the ankle joint has been suggested as a major contributor to the increased tension on the plantar fascia, especially in individuals with a BMI greater than 27, leading to overpronation and excessive weight-bearing stress on the medial longitudinal arch (9).

Studies indicate that the prevalence of plantar fasciitis is particularly high among middle-aged individuals aged 40 to 60 years, and the condition tends to worsen with increased age, higher BMI, and prolonged standing (10). In the context of occupational health, security guards are frequently exposed to prolonged standing and walking on hard surfaces, which predisposes them to chronic heel pain and subsequent plantar fasciitis (11). The degenerative process in plantar fasciitis is often accompanied by morning stiffness, which gradually subsides with continued activity,

though excessive loading or altered footwear can exacerbate symptoms (12). Furthermore, there is a strong association between plantar fasciitis and individuals who are required to maintain prolonged static postures, such as standing or walking for more than eight hours a day (13). This occupational hazard is compounded by the lack of supportive footwear and the repetitive strain placed on the plantar fascia, resulting in microtears and chronic irritation over time (14).

Although plantar fasciitis has been widely studied in athletic populations, there is limited epidemiological data on its prevalence among occupational groups like security guards, who may also experience similar repetitive strain injuries due to the nature of their work (15). The condition often requires a multifaceted management approach, including conservative treatments such as rest, nonsteroidal anti-inflammatory drugs (NSAIDs), orthotic support, and stretching exercises, with surgical interventions reserved for severe, refractory cases (16). Considering the significant impact of plantar fasciitis on daily activities and quality of life, further research is warranted to identify effective preventive strategies and management protocols, particularly for high-risk occupational groups (17). Therefore, this study aims to evaluate the prevalence of plantar fasciitis among security guards, a population frequently subjected to prolonged standing and weight-bearing, to identify potential risk factors and inform targeted interventions (18).

MATERIAL AND METHODS

The study employed a descriptive cross-sectional design and was conducted over a period of four months across multiple locations within Gujranwala city. The research focused on assessing the prevalence of plantar fasciitis among security guards, targeting those who were frequently engaged in prolonged standing and weight-bearing activities due to the nature of their occupational duties. A non-probability convenient sampling technique was used to recruit a total of 177 male security guards aged between 30 to 60 years, with a minimum of one year of professional experience. Participants were included based on their availability and willingness to participate, provided they met the eligibility criteria of working for a minimum of 4 to 8 hours daily with a break of no more than 30 minutes. Individuals with a history of systemic diseases, any physical disability, or previous injuries such as calcaneus fractures or tarsal tunnel syndrome were excluded from the study to avoid confounding factors that could influence the development of plantar fasciitis.

The data collection process involved obtaining demographic information, including participants' name, age, height, and weight, followed by clinical assessments specifically designed to identify plantar fasciitis. Ethical approval for the study was obtained from the institutional review board (IRB) of the respective department, ensuring that the research adhered to the ethical principles outlined in the Declaration of Helsinki for studies involving human subjects. Each participant provided written informed consent after being fully briefed on the study's purpose, procedures, and potential risks. The study ensured participant anonymity and confidentiality throughout the research process.

The primary clinical assessment for diagnosing plantar fasciitis involved the administration of the Windlass test, a validated measure that assesses the integrity of the plantar fascia and its response to mechanical loading. Pain severity was evaluated using the Visual Analog Scale (VAS), which ranged from 0 to 10, with higher scores indicating greater pain intensity. Participants were categorized based on the presence or absence of morning stiffness, heel pain, and the overall results of the Windlass test. Additionally, anthropometric measures were obtained to calculate the body mass index (BMI) using the formula: weight in kilograms divided by height in meters squared (kg/m^2), with the participants categorized into normal, overweight, or obese groups based on standard WHO BMI criteria. The influence of occupational factors such as work experience, duty hours, and posture during work (sitting, standing, or mixed) was also evaluated, given their potential role in the development and progression of plantar fasciitis.

All data were analyzed using SPSS version 25. Descriptive statistics, including frequencies and percentages, were computed for categorical variables, while mean and standard deviations were used to describe continuous variables. Chi-square tests were performed to assess the association between plantar fasciitis and risk factors such as age, BMI, work duration, and foot type. A p-value of less than 0.05 was considered statistically significant in determining the relationships between variables (19). Further stratified analysis was conducted to explore the prevalence of plantar fasciitis among different age groups and BMI categories to highlight specific trends and occupational risk factors in the security guard population.

The study findings were disseminated through research presentations and manuscript submission to relevant journals, ensuring the results contribute to the broader body of literature on occupational health and musculoskeletal disorders. By identifying the prevalence and associated risk factors of plantar fasciitis among security guards, this study aimed to inform the development of targeted preventive strategies and interventions, thereby improving occupational health outcomes for individuals engaged in similar high-risk professions.

RESULTS

The study sample consisted of 177 male security guards, with demographic and clinical characteristics summarized in Table 1. The majority of participants, 38.4% (68 participants), were between 40 to 50 years of age, while 36.7% (65 participants) were in the 30 to 40-year age group, and 24.9% (44 participants) were between 50 to 60 years old. Body mass index (BMI) was categorized as normal (18.5-24.9), overweight (25-29.9), and obese (≥30), with 57.6% (102 participants) having a normal BMI, 37.3% (66 participants) categorized as overweight, and 4.0% (7 participants) categorized as obese.

The work experience of participants varied, with 41.8% (74 participants) having 5 to 10 years of experience, while 37.3% (66 participants) had 1 to 5 years of experience, and 20.9%

(37 participants) had more than 10 years of experience. Duty hours were also assessed, with 44.1% (78 participants) working more than 8 hours per day, 38.4% (68 participants) working between 6 to 7 hours, and 17.5% (31 participants) working 4 to 5 hours per day.

Regarding the working posture, the majority of security guards (66.1%, 117 participants) reported a mixed working posture (alternating between sitting and standing), while 19.2% (34 participants) reported predominantly standing, and 14.7% (26 participants) reported sitting during duty hours.

The primary clinical outcomes, including the presence of plantar fasciitis, morning stiffness, and heel pain, are shown in Table 2. Out of the total sample, only 14 participants (7.9%) tested positive for plantar fasciitis using the Windlass test, while 163 (92.1%) tested negative.

Morning stiffness was reported by 14 participants (7.9%), and heel pain was experienced by 61 participants (34.5%).

Table 1: Demographic and Occupational Characteristics of Security Guards (N = 177)

Variable	n (%)
Age	
30 to 40 years	65 (36.7%)
40 to 50 years	68 (38.4%)
50 to 60 years	44 (24.9%)
BMI	
<18.5 (Underweight)	2 (1.1%)
18.5 to 24.9 (Normal)	102 (57.6%)
25 to 29.9 (Overweight)	66 (37.3%)
≥30 (Obese)	7 (4.0%)
Work Experience	
1 to 5 years	66 (37.3%)
5 to 10 years	74 (41.8%)
>10 years	37 (20.9%)
Duty Hours	
4 to 5 hours	31 (17.5%)
6 to 7 hours	68 (38.4%)
>8 hours	78 (44.1%)
Working Posture	
Sitting	26 (14.7%)
Standing	34 (19.2%)
Mixed	117 (66.1%)
Foot Type	
Normal	172 (97.2%)
Low Arch (Pes planus)	5 (2.8%)
Pain Present	
Unilateral	34 (19.2%)
Bilateral	26 (14.7%)
None	117 (66.1%)
Pain Severity (VAS Scale)	
0 (No Pain)	116 (65.5%)
1-3 (Mild Pain)	27 (15.3%)
4-6 (Moderate Pain)	25 (14.1%)
7-10 (Severe Pain)	9 (5.1%)
Sides Affected	
Right Foot	14 (7.9%)
Left Foot	20 (11.3%)
Both Feet	26 (14.7%)
None	117 (66.1%)

The study revealed that among the total 177 security guards, only 14 (7.9%) were diagnosed with plantar fasciitis using the Windlass test, indicating a relatively low prevalence of the condition within this occupational group. Morning stiffness was reported by 7.9% (14 participants), while 34.5% (61 participants) reported experiencing heel pain. Of those with heel pain, 7.9% (14 participants) experienced unilateral pain, 11.3% (20 participants) had pain in the left foot, and 14.7% (26 participants) had bilateral pain. The majority of security guards did not report pain, with 65.5% (116 participants) having no heel pain at all.

Further analysis showed a significant association between age, BMI, duty hours, and the presence of plantar fasciitis ($p<0.05$). Participants aged 50 to 60 years and those with a BMI greater than 25 were at higher risk of developing plantar fasciitis. Similarly, those working more than 8 hours per day and standing for prolonged periods were more likely to report morning stiffness and heel pain. These findings suggest that occupational factors, such as prolonged.

Table 2: Clinical Outcomes Among Security Guards (N = 177)

Variable	n (%)
Morning Stiffness	
No	163 (92.1%)
Yes	14 (7.9%)
Heel Pain	
No	116 (65.5%)
Yes	61 (34.5%)
Diagnostic Test (Windlass Test)	
Negative	163 (92.1%)
Positive	14 (7.9%)

standing and higher BMI, play a crucial role in the development of plantar fasciitis among security guards The low prevalence of plantar fasciitis, despite a relatively high rate of heel pain, may indicate that early intervention and appropriate footwear can prevent the progression of heel pain into chronic plantar fasciitis in this occupational group.

DISCUSSION

The findings of this study indicated that the prevalence of plantar fasciitis among security guards was 7.9%, which is relatively low compared to similar studies conducted in occupational settings. Previous research on military personnel and healthcare workers reported higher prevalence rates, with studies by Sadat Ali et al. showing a prevalence of 30% among military personnel due to the physically demanding nature of their work (18). This discrepancy could be attributed to differences in occupational activities and the level of physical exertion required in each profession. Moreover, the present study highlighted that age, BMI, prolonged duty hours, and morning stiffness were significantly associated with the development of plantar fasciitis, consistent with the findings of Werner et al., who identified these factors as critical contributors to plantar fascia pathology in assembly line workers (9).

In this study, security guards aged 50 to 60 years demonstrated a higher risk of plantar fasciitis compared to younger age groups. This age-related increase in plantar fasciitis could be linked to the cumulative effect of mechanical stress on the plantar fascia over time, as well as age-related degenerative changes in the connective tissue structure (7). Furthermore, participants with a BMI greater than 25 had a notably higher prevalence of plantar fasciitis, reinforcing the role of obesity in the pathogenesis of this condition. Studies have shown that excessive body weight increases the load on the plantar fascia, leading to microtears and collagen degeneration, which is in line with the findings of van Leeuwen et al., who reported a significant association between high BMI and plantar fasciopathy in both athletic and non-athletic populations (10).

The occupational nature of security guards, which often involves prolonged standing and walking, emerged as a critical factor in the development of heel pain and plantar fasciitis. Participants working for more than 8 hours a day were more likely to report morning stiffness and heel pain, consistent with previous findings by Priesand et al., which emphasized that prolonged weight-bearing activities lead to increased tension on the plantar fascia, resulting in degenerative changes and chronic pain (13). Although this study did not evaluate the impact of flooring type on plantar fasciitis, previous research by M G B et al. indicated that hard surfaces exacerbate heel pain, suggesting that the nature of the floor could be an additional risk factor in occupational settings (15).

Despite the relatively low prevalence of plantar fasciitis, the study's findings are significant as they underscore the need for early identification and intervention in high-risk occupational groups. The use of supportive footwear, stretching exercises, and weight management strategies should be considered to mitigate the risk of plantar fasciitis in security guards. Additionally, this study revealed that morning stiffness was a common symptom among participants with plantar fasciitis, aligning with the findings of Goff and Crawford, who emphasized that morning pain and stiffness are hallmark features of this condition due to the accumulation of inflammatory mediators during rest (12).

One of the strengths of this study was its focus on a specific occupational group, allowing for a targeted evaluation of plantar fasciitis risk factors in a real-world setting. However, the study had several limitations. The use of a non-probability convenient sampling method could have introduced selection bias, potentially affecting the generalizability of the results to other occupational groups. Additionally, the cross-sectional design precluded the establishment of causal relationships between the identified risk factors and plantar fasciitis. Another limitation was the reliance on self-reported data for pain assessment, which may have been influenced by subjective bias. Future studies should employ a longitudinal design with a larger sample size and include a comprehensive evaluation of workplace ergonomics and environmental factors, such as footwear and surface types, to better understand the multifactorial nature of plantar fasciitis.

The findings of this study have important implications for occupational health practices. Implementing preventive strategies, such as modifying work schedules to reduce prolonged standing, encouraging the use of orthotic devices, and promoting regular stretching exercises, could reduce the risk of plantar fasciitis among security guards. Health education programs focusing on weight management and ergonomics should also be incorporated into occupational health guidelines. Further research is needed to explore the role of specific occupational

activities, footwear choices, and other environmental factors in the development of plantar fasciitis among security personnel, which could inform the development of tailored interventions to prevent this condition in high-risk populations (16).

CONCLUSION

The study concluded that the prevalence of plantar fasciitis among security guards was relatively low, with age, BMI, prolonged standing, and morning stiffness identified as significant risk factors for its development. This highlights the need for targeted preventive strategies, such as weight management, appropriate footwear, and ergonomic interventions, particularly for older individuals and those with high BMI. From a healthcare perspective, early identification and management of plantar fasciitis in high-risk occupational groups can prevent long-term complications, reduce absenteeism, and improve overall quality of life and job performance, thereby emphasizing the importance of integrating preventive health measures into workplace policies.

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