

*Original Article*

# Prevalence of Heel Pain Among Retired Soldiers After Retirement: A Cross-Sectional Study

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## ABSTRACT

**Background:** Heel pain is a common musculoskeletal complaint that may affect walking, prolonged standing, and daily functional activities. Soldiers are exposed to prolonged marching, load carriage, repetitive training, and long-standing duties during service, but limited evidence is available regarding heel pain after retirement. **Objective:** To determine the prevalence of heel pain and describe foot-related functional status among retired soldiers. **Methods:** A cross-sectional observational study was conducted over six months among retired soldiers aged above 35 years with at least 10 years of military service. A total of 152 participants were recruited through non-probability convenience sampling. Data were collected using an online questionnaire, and foot-related functional status was assessed using the Foot Function Index. Data were analyzed using IBM SPSS Statistics version 25. Categorical variables were reported as frequencies and percentages, while continuous variables were summarized as mean  $\pm$  standard deviation. **Results:** Most participants were aged 51–60 years (72.4%) and male (98.7%). The mean military service duration was  $22.88 \pm 4.69$  years, and the mean duration since retirement was  $12.14 \pm 6.06$  years. Heel pain was reported by 18 participants, giving a prevalence of 11.8%. The mean Foot Function Index score was  $4.49 \pm 11.57$ . **Conclusion:** Heel pain affected approximately one in nine retired soldiers. Although overall functional limitation was low in the total sample, heel pain remains a clinically relevant post-service musculoskeletal complaint requiring preventive screening and rehabilitation attention. **Keywords:** Heel Pain, Retired Soldiers, Military Service, Foot Function Index, Musculoskeletal Disorder, Prevalence.

## INTRODUCTION

Plantar heel pain is one of the most common musculoskeletal complaints affecting the foot and ankle region and is frequently associated with limitations in walking, prolonged standing, occupational participation, and daily functional activities. The term heel pain includes a spectrum of clinical conditions such as plantar fasciitis, heel fat pad syndrome, calcaneal stress-related pain, peripheral nerve irritation, and referred symptoms from lumbar radiculopathy, making it a clinically heterogeneous condition that requires careful functional and contextual assessment. Population-based evidence indicates that plantar heel pain affects a meaningful proportion of adults, with reported prevalence estimates ranging from 3.6% to 7.3% in the general adult population and higher estimates among middle-aged and older adults, particularly those exposed to repetitive weight-bearing activities (1). Recent epidemiological findings further suggest that plantar heel pain is more commonly reported in older age groups, with prevalence estimates around 9.6% to 11.1% among middle-aged and elderly adults, highlighting age-related connective tissue changes, cumulative mechanical loading, and reduced tissue recovery capacity as potential contributors to symptom development (2).

Military service represents a distinctive occupational environment in which the lower extremities are repeatedly exposed to high cumulative loads over prolonged periods. Soldiers are required to perform long-distance marching, prolonged standing, repetitive running, load carriage, combat training, and field duties, all of which increase mechanical stress across the plantar fascia, heel pad, Achilles tendon insertion, and adjacent osseous and soft-tissue structures. Footwear-related factors may further contribute to lower-limb discomfort, particularly when military boots are rigid, poorly fitted, or insufficiently adapted to individual foot morphology and training demands. Previous research among infantry soldiers has reported an association between footwear comfort, selected shoe size, and lower-leg overuse injuries, indicating that occupational footwear may influence lower-extremity symptom burden in military populations (3). In addition, military-related overuse injuries are commonly attributed to repetitive loading, sustained weight-bearing, and the physical demands of service, which can lead to persistent lower-limb pain syndromes even after the period of active duty has ended (4).

Although lower-limb overuse injuries have been widely discussed in active military personnel, less attention has been given to the post-service musculoskeletal health of retired soldiers. This is an important gap because retirement may reduce active occupational loading, yet symptoms related to cumulative tissue stress, degenerative changes, previous microtrauma, and long-term biomechanical strain may persist or become clinically evident in later life. Non-traumatic lower-limb conditions in military populations commonly arise from repeated physical exertion rather than a single injury event, and exercise-induced leg pain may include tendinopathies, exertional compartment syndromes, vascular entrapment, medial tibial stress syndrome, and related overuse presentations (5). Within this broader pattern of occupational musculoskeletal burden, heel pain deserves focused investigation because it can restrict walking speed, endurance, balance confidence, and participation in daily activities among older adults.

From a rehabilitation perspective, heel pain is clinically relevant because it is often multifactorial and may require an integrated assessment of pain intensity, functional limitation, footwear, tissue load tolerance, ankle and foot biomechanics, and psychosocial contributors. Physiotherapy management frequently includes patient education, activity modification, manual therapy, stretching, strengthening exercises, progressive loading, and symptom-modulation strategies; however, effective care depends on identifying the population-specific burden and functional impact of the condition (6). Retired soldiers represent a population with prolonged previous occupational exposure to lower-limb loading, but evidence regarding the prevalence and functional consequences of heel pain in this group remains limited. Therefore, the present study was conducted to determine the prevalence of heel pain among retired soldiers and to describe its associated functional impact using the Foot Function Index.

## **MATERIALS AND METHODS**

A cross-sectional observational study was conducted to determine the prevalence of heel pain and related functional limitations among retired soldiers. Data were collected over a six-month period after synopsis approval using an online Google Forms-based questionnaire. Participants were selected through a non-probability convenience sampling technique. The target population comprised retired military personnel aged more than 35 years who had completed at least 10 years of military service. Both male and female retired soldiers were eligible for participation. Individuals were included if they were able to understand and complete the questionnaire and provided consent for participation. Participants were excluded if they had a history of ankle or foot surgery, cognitive impairment affecting reliable questionnaire completion, or inability to provide dependable self-reported information.

Recruitment and data collection were performed through an online questionnaire format. Before completing the form, participants were informed about the purpose of the study, voluntary nature of participation, and confidentiality of their responses. Consent was obtained before data submission. The questionnaire collected demographic and service-related information, including age category, sex,

duration of military service, and duration since retirement. The primary study outcome was the presence of self-reported heel pain among retired soldiers. Heel pain status was recorded as present or absent, and participants reporting heel pain were further categorized according to symptom duration, including less than one week, one to two weeks, and more than one month. Functional status related to foot symptoms was assessed using the Foot Function Index, which evaluates pain, disability, and activity limitation associated with foot problems.

The main variables of interest included heel pain prevalence, symptom duration, years of military service, years since retirement, and Foot Function Index score. Heel pain prevalence was operationally defined as the proportion of participants reporting heel pain among the total sample of retired soldiers. Functional impact was represented through the Foot Function Index score, with higher scores indicating greater pain, disability, or activity limitation. Data quality was supported by using a uniform online form for all participants, applying predefined eligibility criteria, and restricting participation to retired soldiers meeting the required age and service-duration criteria. Potential sources of bias included convenience sampling, self-reported symptom status, recall-related variation, and online-response bias; therefore, findings were interpreted as descriptive estimates for the recruited sample rather than population-level causal associations.

Data were entered and analyzed using IBM SPSS Statistics version 25. Descriptive statistics were used to summarize demographic characteristics, military-service profile, retirement duration, heel pain prevalence, symptom duration, and Foot Function Index findings. Categorical variables were reported as frequencies and percentages, while continuous variables were summarized as mean and standard deviation. The prevalence of heel pain was calculated by dividing the number of participants reporting heel pain by the total sample size and multiplying by 100. All analyses were performed using the available responses, and results were presented according to the relevant denominator for each variable. Ethical principles for human-subject research were followed, including informed consent, voluntary participation, confidentiality of participant information, and use of the collected data only for research purposes.

## RESULTS

A total of 152 retired soldiers were included in the study. The majority of participants were male, and most belonged to the 51–60-year age group. The mean duration of military service was  $22.88 \pm 4.69$  years, while the mean duration since retirement was  $12.14 \pm 6.06$  years.

*Table 1. Demographic and Military-Service Characteristics of Participants*

Variable	Category/Measure	n	%	Mean $\pm$ SD
Total sample	—	152	100.0	—
Age group	51–60 years	110	72.4	—
Sex	Male	150	98.7	—
Sex	Female	2	1.3	—
Military service duration	Years	—	—	$22.88 \pm 4.69$
Duration since retirement	Years	—	—	$12.14 \pm 6.06$

SD, standard deviation.

Most participants were aged 51–60 years, representing 110 of 152 participants (72.4%). The study sample was predominantly male, with 150 male participants (98.7%) and 2 female participants (1.3%). Participants had completed a mean military service duration of  $22.88 \pm 4.69$  years and had been retired for a mean duration of  $12.14 \pm 6.06$  years, indicating prolonged prior occupational exposure followed by a substantial post-retirement period.

The prevalence of heel pain among retired soldiers was 11.8%, with 18 of 152 participants reporting heel pain. Most participants, 134 of 152 (88.2%), did not report heel pain. Among the total sample, 14 participants (9.2%) reported heel pain lasting more than one month, 3 participants (2.0%) reported pain

for less than one week, and 1 participant (0.7%) reported pain for one to two weeks. The distribution indicates that most reported heel pain episodes were longer than one month among those who experienced symptoms.

**Table 2. Prevalence and Duration of Heel Pain Among Retired Soldiers**

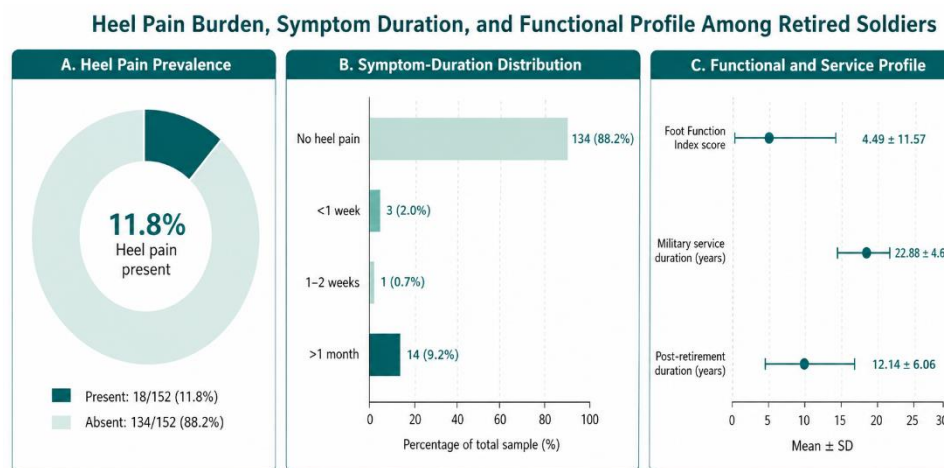
Variable	Category	n	%
Heel pain status	Present	18	11.8
Heel pain status	Absent	134	88.2
Symptom duration	Less than 1 week	3	2.0
Symptom duration	1–2 weeks	1	0.7
Symptom duration	More than 1 month	14	9.2
Symptom duration	No heel pain	134	88.2

**Table 3. Foot Function Index Summary**

Variable	n	Mean ± SD
Foot Function Index score	152	4.49 ± 11.57

SD, standard deviation.

The mean Foot Function Index score was  $4.49 \pm 11.57$  among the total sample of 152 participants. This value suggests a low average level of foot-related functional limitation across the full study sample; however, interpretation is limited because separate Foot Function Index subscale values for pain, disability, and activity limitation were not available in the supplied data.



**Figure 1** Heel pain prevalence, symptom-duration distribution, and descriptive functional-service profile among retired soldiers. Panel A shows that heel pain was reported by 18 of 152 participants (11.8%), while 134 participants (88.2%) reported no heel pain. Panel B demonstrates that longer-duration heel pain was the most frequent symptomatic category, with 14 participants (9.2% of the total sample) reporting symptoms for more than one month. Panel C summarizes the available descriptive profile, including a mean Foot Function Index score of  $4.49 \pm 11.57$ , mean military service duration of  $22.88 \pm 4.69$  years, and mean post-retirement duration of  $12.14 \pm 6.06$  years.

**Table 4. Available Heel Pain Indicators Requiring Clarification Before Final Publication**

Indicator	Reported Value	Required Clarification
Bilateral heel pain	92.8%	Exact numerator and denominator
Foot Function Index pain subscale	Not reported	Subscale score
Foot Function Index disability subscale	Not reported	Subscale score
Foot Function Index activity limitation subscale	Not reported	Subscale score
Difficulty during running or fast walking	Reported narratively	Item-level value
Heel pain by age group	Not reported	Cross-tabulation
Heel pain by sex	Not reported	Cross-tabulation
Heel pain by military service duration	Not reported	Group-wise summary
Heel pain by retirement duration	Not reported	Group-wise summary

The manuscript reports that bilateral heel pain was common among affected participants, but the exact numerator and denominator are not provided. The value of 92.8% requires verification before

publication because it cannot be clearly reconciled with the total number of participants reporting heel pain. Similarly, the manuscript mentions greater difficulty during running or fast walking, but the corresponding Foot Function Index item-level values are not provided. Group-wise comparisons by age, sex, military service duration, and retirement duration could not be reported because the required cross-tabulated or raw data were unavailable.

Overall, heel pain was reported by approximately one in nine retired soldiers in this cross-sectional sample. The highest available symptom-duration category was heel pain lasting more than one month, reported by 14 participants. Although the average Foot Function Index score was low across the total sample, the absence of subscale scores and group-wise comparisons limits interpretation of the functional burden among participants with heel pain.

## DISCUSSION

The present cross-sectional study found that heel pain was reported by 18 of 152 retired soldiers, giving a prevalence of 11.8%. This finding indicates that approximately one in nine participants experienced heel pain after retirement. Although the overall Foot Function Index score was low, with a mean value of  $4.49 \pm 11.57$ , the presence of heel pain in a post-service population remains clinically relevant because even localized foot symptoms may influence walking speed, prolonged standing tolerance, activity participation, and quality of daily function in older adults. The study sample had a long history of military exposure, with a mean service duration of  $22.88 \pm 4.69$  years, suggesting that participants had experienced prolonged occupational demands before retirement. However, because of the cross-sectional design, the findings should be interpreted as descriptive prevalence estimates rather than evidence of a causal relationship between military service and heel pain.

The observed prevalence is broadly consistent with population-based evidence showing that plantar heel pain is common among middle-aged and older adults. Liu et al. reported that plantar heel pain prevalence in adults varied around 9.6% to 11.1%, with higher occurrence in older age groups (2). The present estimate of 11.8% is close to those population-level figures and may reflect the combined influence of aging, cumulative mechanical loading, connective tissue changes, and previous occupational exposure. Most participants in the present study were aged 51–60 years, which is also consistent with the age pattern reported in previous epidemiological work (2). Age-related reduction in plantar fascia elasticity, changes in heel fat pad shock absorption, and cumulative microtrauma may contribute to heel symptoms in this age range, although these mechanisms were not directly assessed in the present study.

The military context is important when interpreting these findings. Soldiers are repeatedly exposed to prolonged marching, standing, running, field training, and load carriage, all of which increase cumulative mechanical demand on the lower extremity. Previous evidence has suggested that footwear comfort, selected shoe size, and lower-leg overuse injuries may be related among infantry soldiers, indicating that occupational footwear may influence musculoskeletal symptoms in military populations (3). Similarly, military overuse injuries are commonly associated with repetitive loading and sustained physical demand rather than isolated traumatic events (4). The present study did not directly assess boot type, training load, marching distance, occupational duties, or previous lower-limb injury history; therefore, it cannot determine which military-related exposures were associated with heel pain. Nevertheless, the finding supports the need for greater attention to foot health screening and preventive rehabilitation strategies among military personnel and retired soldiers.

The prevalence found in this study was higher than the 7.9% prevalence of plantar fasciitis reported among security guards by Nadeem et al. (6), but lower than the 26.1% prevalence reported among police personnel by Pradhan et al. (7) and the 29.5% prevalence reported among construction workers by Mehmood et al. (8). These differences may be explained by variations in occupational status, diagnostic definitions, sampling approaches, age distribution, activity exposure, and whether the outcome was

defined as heel pain or clinically diagnosed plantar fasciitis. Active occupations such as policing, security work, and construction may involve ongoing prolonged standing and weight-bearing exposure, while retired soldiers may have reduced daily occupational loading after leaving service. Therefore, the lower prevalence in the present study compared with some active occupational groups may reflect reduced exposure after retirement, but this interpretation remains cautious because current activity level and post-retirement occupation were not measured.

A notable point in the manuscript is the report that bilateral heel pain was common among symptomatic participants. Bilateral symptoms may suggest a cumulative or systemic loading pattern rather than a single unilateral traumatic event. Sullivan et al. emphasized the role of mechanical factors such as prolonged standing, body weight, limited ankle dorsiflexion, and repetitive loading in the clinical presentation of plantar heel pain (9). These factors are relevant to military and physically demanding occupational populations. However, the exact numerator and denominator for bilateral heel pain were not clearly provided in the available results, and the reported percentage requires verification before final publication. This value should therefore be interpreted with caution until the underlying count is confirmed.

The functional findings also require careful interpretation. The mean Foot Function Index score was  $4.49 \pm 11.57$  across the full sample, suggesting low average foot-related functional limitation. However, because the total sample included a large proportion of participants without heel pain, the overall mean may underestimate functional burden among the symptomatic subgroup. Furthermore, subscale scores for pain, disability, and activity limitation were not available, and item-level results for activities such as running or fast walking were not reported. Future analyses should compare Foot Function Index scores between participants with and without heel pain and should present pain, disability, and activity limitation subscales separately. Such reporting would allow clearer interpretation of whether heel pain meaningfully affects functional performance among retired soldiers.

This study has several limitations. First, the non-probability convenience sampling technique limits generalizability to all retired soldiers. Second, data were collected through an online self-reported questionnaire, which may introduce recall bias, response bias, and digital-access bias. Third, heel pain was self-reported and was not clinically confirmed through physical examination, imaging, or diagnostic criteria for plantar fasciitis or other heel pain conditions. Fourth, several potentially important risk factors, including body mass index, footwear history, current activity level, comorbidities, previous lower-limb injury, foot posture, and ankle dorsiflexion, were not reported. Fifth, the cross-sectional design prevents conclusions about temporality or causation. Despite these limitations, the study provides useful descriptive evidence on heel pain among retired soldiers and highlights the need for structured foot-health assessment, preventive footwear guidance, progressive loading strategies, and rehabilitation screening in military and post-military populations.

## CONCLUSION

Heel pain was reported by 11.8% of retired soldiers in this cross-sectional sample, indicating that approximately one in nine participants experienced heel pain after retirement. The average Foot Function Index score was low across the total sample, but the absence of subgroup and subscale findings limits detailed interpretation of functional burden among symptomatic participants. The findings suggest that heel pain remains a clinically relevant musculoskeletal complaint in retired soldiers and should be considered during post-service health screening and rehabilitation planning. Future studies should use probability-based sampling, clinical diagnostic confirmation, subgroup analysis, and assessment of footwear, body mass index, activity level, and military exposure history to clarify the determinants and functional consequences of heel pain in retired military populations.

## REFERENCES

1. Chang AH, Rasmussen SZ, Jensen AE, Sørensen T, Rathleff MS. What do we actually know about a common cause of plantar heel pain? A scoping review of heel fat pad syndrome. *J Foot Ankle Res.* 2022;15(1):60.
2. Liu P, Chen Q, Yang K, Cai F. Prevalence, characteristics, and associated risk factors of plantar heel pain in Americans: the cross-sectional NHANES study. *J Orthop Surg Res.* 2024;19(1):805.
3. Nesterovica D, Vaivads N, Stepens A. Relationship of footwear comfort, selected size, and lower leg overuse injuries among infantry soldiers. *BMC Musculoskelet Disord.* 2021;22(1):952.
4. Sellon E, Goodall D, Barker-Davies R, Crick A, Ashburner A. Musculoskeletal overuse injuries of lower limb in military. In: *Orthopedics of the Upper and Lower Limb.* Cham: Springer International Publishing; 2020. p. 635–53.
5. McClinton S, Heiderscheid B, Thomas G, W. Timothy. Physical therapist decision-making in managing plantar heel pain: cases from a pragmatic randomized clinical trial. *Physiother Theory Pract.* 2020.
6. Nadeem N, Nisar I, Attar AA, Lohana A, Suleman H, Syed SH, et al. Prevalence of plantar fasciitis among security guards. *J Health Rehabil Res.* 2024;4(3):1–5.
7. Pradhan S, Shrestha A, Thapa S, Yadav RR. Prevalence of plantar fasciitis among police personnel: a cross-sectional study. *One Health J Nepal.* 2025;5(10):45–8.
8. Mehmood N, Asif M, Nawaz M, Mansha A, Dastgeer G. Prevalence of plantar fasciitis in construction workers of Lahore standing more than 8 hours. *J Health Wellness Community Res.* 2025:e293.
9. Sullivan J, Pappas E, Burns J. Role of mechanical factors in the clinical presentation of plantar heel pain: implications for management. *Foot.* 2020;42:101636.
10. Sidiq M, Alenazi W, Kashoo FZ, Qasim M, Lopez MP, Ahmad M, et al. Prevalence of non-specific chronic low-back pain and risk factors among male soldiers in Saudi Arabia. *PeerJ.* 2021;9:e12249.
11. Khired Z, Najmi MH, Akkur AA, Mashhour MA, Bakri KA, Najmi M, et al. The prevalence and risk factors of plantar fasciitis amongst the population of Jazan. *Cureus.* 2022;14(9).