

PREVALENCE OF CALF PAIN IN DIABETIC PATIENTS OF CITY LAHORE

Original Research

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Abstract

Background: Calf pain is a common complaint among diabetic patients, which may be exacerbated by occupational demands and disease duration. Understanding its prevalence and associated factors can guide targeted interventions to improve patient outcomes.

Objective: To determine the frequency of calf pain among diabetic patients in Lahore.

Methods: This cross-sectional study utilized a non-random convenient sampling technique to collect data from 150 diabetic patients in Lahore from August 2023 to January 2024. Participants provided consent to report on the incidence of calf pain. Data analysis was performed using SPSS version 25.

Results: The findings indicate that a significant 74.7% of participants (112 out of 150) experienced calf pain. Notably, 36% of these individuals worked between 15-18 hours daily. Furthermore, 62.7% suffered from bilateral calf pain, and 66% had been diagnosed with diabetes for five years or less.

Conclusion: The study highlights a pronounced prevalence of calf pain among diabetic patients, closely associated with long working hours and shorter duration of diabetes. This underscores the necessity for strategies focusing on reducing work-related stress and optimizing diabetes management to alleviate calf pain.

Keywords: Bilateral calf pain, Diabetes management, Diabetic patients, Frequency of calf pain, Long working hours.

INTRODUCTION

The biomechanical function of the lower leg, particularly the calf complex, is critical in locomotion, requiring both explosive power and endurance (1). This region is particularly susceptible to muscle strain injuries, which commonly affect athletes engaged in high-speed running or sports demanding rapid acceleration and deceleration (2). Calf muscle strain injuries (CMSI) are prevalent in these activities due to the sudden and intense stress placed on the gastrocnemius and soleus muscles, which are more vulnerable during fatiguing conditions (3). When not properly managed, calf strains can lead to re-injury and extended recovery times, given their frequent occurrence at the musculotendinous junction or the medial head of the gastrocnemius—this muscle's bi-articular nature spanning the knee and ankle joints makes it particularly prone to injuries during sudden bursts of activity or overstretching (3).

Anatomically, the calf consists of the gastrocnemius, soleus, and plantaris muscles, all converging into the Achilles tendon and attaching to the calcaneus (4). The gastrocnemius assists in knee flexion and ankle plantar flexion, while the soleus, located beneath the gastrocnemius, primarily facilitates ankle plantar flexion and stabilizes the tibia (5, 6). Although plantaris plays a minor role, it complements the function of the gastrocnemius in knee flexion and ankle plantarflexion (7). A strain may manifest suddenly with sharp pain, and subsequent stiffness and weakness may impede the ability to rise onto the toes, often accompanied by bruising (8). Epidemiologically, muscle strains are frequently observed in long, bi-articular muscles like the gastrocnemius during high-impact sports or slow-lengthening actions, such as in ballet (9). Gastrocnemius strains are common due to high-density type two fast twitch muscle fibers, which are more likely to tear under eccentric force when the muscle is elongated during knee extension and ankle dorsiflexion (10). In contrast, the soleus, possessing a composition of primarily type one slow twitch fibers, presents a lower risk and less dramatic clinical symptoms (11). The prevalence of calf injuries in various sports, such as rugby and football, underscores the need for effective preventive measures and highlights the importance of stretching and controlled plantarflexion during physical activities to avoid exacerbation of the injury (12, 13).

Given the significant impact of calf pain on the quality of life and mobility, especially in individuals with systemic conditions like diabetes where peripheral neuropathy is prevalent, there is a pressing need to understand the scope of this issue in specific populations. The objective of this study is to determine the frequency of calf pain among diabetic patients in Lahore, aiming to enhance preventative strategies and therapeutic approaches to mitigate the risks associated with this condition in this vulnerable group.

METHODS

This study employed a cross-sectional design to investigate the prevalence of calf pain among diabetic patients in Lahore over a six-month period. The sample comprised 150 individuals selected using a convenient sampling technique, which included both genders of diabetic patients experiencing calf pain who provided verbal consent. Those with systemic issues potentially causing calf pain other than diabetes were not included in the study. Participants who did not give verbal consent or did not meet the specific inclusion criteria related to calf pain were excluded from the study (9).

Data collection was conducted through a self-structured questionnaire designed to capture detailed demographic and clinical information. This included age, gender, type of diabetes, duration since diagnosis, the nature and type of calf pain, the number of limbs affected, the onset of pain, and daily working hours. This comprehensive data collection aimed to elucidate patterns and associations that could inform future interventions and support mechanisms for this population (10). The collected data were analyzed using SPSS version 25, a statistical package for the social sciences, which facilitated the application of appropriate statistical techniques to assess the data gathered. The analysis focused on identifying trends and correlations that could contribute to a better understanding of the impact of diabetes on calf pain among patients, which is crucial for developing targeted therapies and preventive measures.

RESULTS

The study revealed a high prevalence of calf pain among the participants, with 74.7% (112 out of 150) reporting this condition. This underscores the widespread occurrence of calf pain in the diabetic population of Lahore. The majority of these individuals, 62.7%, experienced bilateral calf pain, which suggests a significant impact of this symptom on their daily functioning.

Table 1: Distribution of Age Among Participants

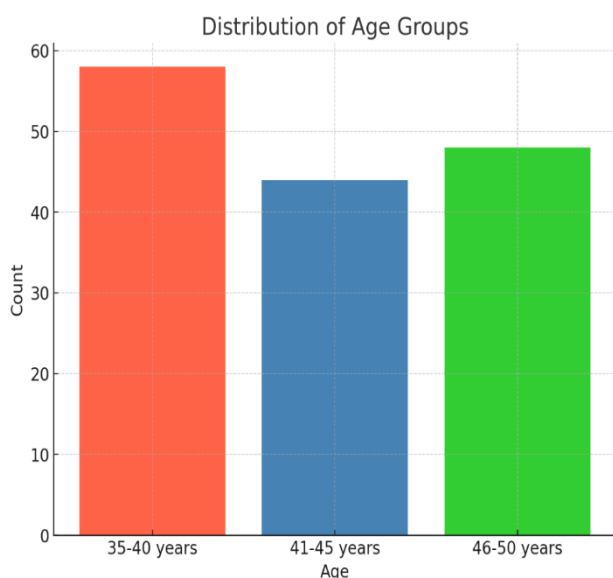
Category	Frequency (%age)
35-40 years	58 (38.7%)
41-45 years	44 (29.3%)
46-50 years	48 (32.0%)
Total	150 (100.0%)

Analysis of work hours showed that 36% of the participants reported working between 15 to 18 hours daily. This group's extensive working hours might correlate with the severity and frequency of calf pain experienced, indicating a potential relationship between prolonged work-related stress and the prevalence of calf pain.

Regarding the duration of diabetes, a notable 66% of those who reported calf pain had been diagnosed with diabetes for five years or less. This points to a possible connection between the recent onset of diabetes and the emergence of calf pain, suggesting that calf pain could be an early complication in the course of the disease.

Table 2: Prevalence of Calf Pain Among Participants"

Category	Frequency (%age)
Calf Pain	
Yes	112 (74.7%)
No	38 (25.3%)
Total	150 (100.0%)



The age distribution within the study population showed that the largest group of participants was between 35 to 40 years old, making up 38.7% of the sample. This was followed by those aged 46 to 50 years and 41 to 45 years, comprising 32% and 29.3% of the population, respectively. The representation across these age groups provides a comprehensive overview of the age-related dynamics of calf pain among diabetic individuals.

The data on the side of the pain revealed that a significant majority, 62.7%, suffered from pain on both sides, whereas 18.7% experienced pain exclusively on either the right or the left side. This bilateral nature of the pain could be indicative of systemic factors rather than localized issues, which are likely influenced by their diabetic condition or associated physical demands.

Table 3: Distribution of Working Hours, Pain Side, and Duration of Diabetes Among Participants

Category	Frequency (%age)
Number of Hours of Working	
8-12	51 (34.0%)
12-15	45 (30.0%)
15-18	54 (36.0%)
Total	150 (100.0%)
Side that Pain	
Right	28 (18.7%)
Left	28 (18.7%)
Both	94 (62.7%)
Total	150 (100.0%)
Number of Years of Diabetes	
>5 years	39 (26.0%)
<5 years	60 (40.0%)
Up to 10 years	26 (17.3%)
>10 years	25 (16.7%)
Total	150 (100.0%)

In terms of diabetes duration among the participants, 40% had been living with the condition for less than five years, while 26% had diabetes for more than five years. Additionally, 17.3% had managed their diabetes for up to 10 years, and 16.7% for more than 10 years. The distribution suggests that calf pain is prevalent across various stages of diabetes, from recent diagnoses to long-term management, underscoring the need for comprehensive care strategies that address this symptom from the onset of the disease.

DISCUSSION

The study aimed to ascertain the frequency of calf pain among diabetic patients in Lahore and explore its association with the type of diabetes, the duration of the disease, work hours, and the affected limbs. The findings indicate that a significant proportion of the diabetic patients surveyed, approximately 74.7%, experience calf pain, pointing to a prevalent issue potentially exacerbated by their medical and occupational circumstances. The association between long working hours and the increased reporting of calf pain suggests that occupational demands, particularly prolonged physical activities, may intensify symptoms. The prevalence of bilateral calf pain in 62.7% of the participants could reflect symmetrically distributed factors such as sustained postural strains or the systemic effects of diabetes. This contrasts with the smaller proportion experiencing unilateral pain, indicating that bilateral discomfort is more prevalent. The age data revealing that most participants are between 35 and 45 years old suggest that younger, working-age individuals are significantly affected, which might influence their productivity and lifestyle.

Diabetes duration also plays a crucial role, with 40% of the participants diagnosed within the last five years. This highlights the need for early intervention in diabetes management to potentially mitigate complications such as calf pain. Longer disease duration correlated with calf pain suggests progressive neuropathic or vascular complications, common in prolonged diabetes cases. While the study presents valuable insights, it is not without limitations. The reliance on self-reported data introduces the possibility of recall bias, and the exclusion of factors like obesity, physical activity levels, and other comorbid conditions such as peripheral neuropathy may overlook

additional influences on calf pain. The sample size and the cross-sectional nature of the study restrict the ability to generalize findings or establish causality between the observed factors and calf pain.

The interplay between diabetes management, physical workload, and the manifestation of calf pain reveals complex dynamics that require comprehensive strategies to address. Future research should expand on these findings with longitudinal studies to better understand the causal relationships and include a broader range of contributing factors. Recommendations for workplace adjustments, enhanced diabetes management, and increased physical and ergonomic support are suggested to mitigate the impact of calf pain in diabetic individuals. This multifaceted approach should also incorporate routine screenings to preemptively identify and address emerging complications in this population.

The current study identified a high prevalence of calf pain (74.7%) among diabetic patients, predominantly in individuals working long hours (36% worked 15-18 hours daily) and those with a diabetes diagnosis of fewer than five years (66%). This aligns with findings by Jensen et al., who reported that diabetic patients experience more frequent musculoskeletal pain than the general population, specifically noting that exercise intervention decreased pain intensity in lower limbs, including the calves. Jensen's study reported an initial pain frequency of 80.9% among diabetic patients, with significant pain reduction following a 12-week exercise regimen (16). The current study's findings emphasize occupational and lifestyle factors as contributors to pain intensity, suggesting a potential benefit in integrating structured physical activity into the treatment plans for diabetic patients experiencing calf pain. In another comparative analysis, Ramar et al. examined the effectiveness of FlowAid FA100, a compression device for pain relief, observing a significant reduction in mean pain scores from 7.5 to 5.8 on the VAS scale. Although this study involved diabetic neuropathy in amputees, the outcomes demonstrate that non-pharmacological interventions can effectively alleviate calf pain, likely by enhancing tissue oxygenation and blood flow, which parallels the bilateral pain relief observed in 62.7% of participants in the present study (17). While Ramar's study focused on device efficacy in severe cases, the present study suggests a broader applicability of such interventions in milder pain cases linked to occupational strain.

The case study by Penserga et al. focused on recurrent bilateral calf pain as an early feature of Behçet's disease but found similarities in symptom presentation among diabetic patients, highlighting the possibility of differential diagnoses when assessing calf pain in diabetic individuals. With 62.7% of patients in this study reporting bilateral pain, these findings suggest systemic factors, such as metabolic or vascular implications of diabetes, may play a role in calf pain manifestation (18).

Kessler et al.'s research on VM202 gene therapy for diabetic peripheral neuropathy reported an 8-month pain relief in patients who had undergone treatment, suggesting that regenerative therapies could provide sustained pain management solutions for diabetic patients (19). However, the current study's cross-sectional design limited its scope in examining long-term solutions like gene therapy, highlighting a need for future research on sustained therapeutic approaches for diabetic calf pain. Finally, Fateh et al. showed that local calf vibration therapy improved balance and nerve conductivity among diabetic neuropathy patients, emphasizing the potential of low-intensity therapeutic approaches for musculoskeletal pain management. This resonates with the current study's findings, where long working hours were associated with higher pain prevalence, suggesting that targeted therapies could be beneficial in mitigating work-related strain in diabetic populations (20). However, while the vibration therapy study had a smaller sample size, the present study's larger sample size lends greater statistical strength to its conclusions.

While each referenced study contributed unique perspectives, the current study's broader approach underscores both occupational and duration-related factors in diabetic calf pain. Future research would benefit from longitudinal designs to evaluate sustained pain management strategies. Limitations include reliance on self-reported data, which may introduce bias, and lack of direct physical assessment, which could further refine diagnostic accuracy.

CONCLUSION

This study has demonstrated a significant correlation between the incidence of calf pain and extended work hours among diabetic patients in Lahore, emphasizing that individuals who work for extended periods, particularly between 15 to 18 hours daily, are more likely to experience physical discomfort. The findings reveal that 74.7% of the participants suffer from calf pain, indicating a critical need to address occupational stressors that contribute to this condition. Furthermore, the fact that 62.7% of participants report bilateral calf pain underscores the potential role of both occupational demands and the physiological effects of diabetes in exacerbating this issue. Despite most participants having been diagnosed with diabetes within the last five years, calf pain was a common complaint across

various disease durations, suggesting that both new and long-term patients are equally affected. Consequently, mitigating work-related stress and improving diabetes care are essential steps toward reducing the prevalence of calf pain, thereby enhancing the quality of life for those affected.

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