RESEARCH PAPER

Prevalence of Plantar Fasciitis among Chefs in Hotel Industry – An Observational Study

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Received: 25th Aug, 2026 | Revised: 1st Sep, 2026 | Accepted: 5th Sep, 2026 | Available Online: 11th Sep, 2026

ABSTRACT
Background: Plantar Fasciitis is a condition that causes inflation of plantar fascia. This band runs at bottom of your foot. Its most common reason for heel pain and discomfort, usually caused due to long standing. It gives a sharp stabbing pain and discomfort. The pain is quite sever at first few steps in morning. As chefs have a long standing profession, with standing hours extending more than 8-9 hours, they are more prone population for plantar fasciitis.
Method: This observational study was conducted on barbers (59 Male and 23 females) using Windlass test for clinical diagnosis of Plantar Fasciitis Participants were given Numerical Pain Rating Scale (NPRS) to analyse the degree of pain. **Result:**71% Participant were tested positive for Windlass Test.
Conclusion: This study concludes that there is 71% prevalence of Plantar Fasciitis in Chefs.
Key words: Plantar Fasciitis, Windlass Test, NPRS, Foot Function Index.
How to cite this article: Shreya P. Patil1 Dr. Aditi Jadhav2*. Prevalence of Plantar Fasciitis among Chefs in Hotel Industry – An Observational Study. Int J Drug Deliv Technol. 2026;16(82s):1065-1072. DOI: 10.25258/ijddt.16.82s.116.

INTRODUCTION

One of the most common musculoskeletal conditions affecting the foot, plantar fasciitis is considered the primary cause of heel pain in adults and accounts for approximately 11–15% of all foot-related complaints requiring professional care. [1] It significantly affects functional capacity and quality of life. The condition causes pain and tenderness at the medial heel due to repetitive stress and degeneration of the plantar fascia. Its association with prolonged standing, walking, and repetitive weight-bearing activities makes it an important concern in both clinical and occupational health. [3]

The foot is a complex structure consisting of 26 bones, 33 joints, ligaments, tendons, muscles, and fascial structures that provide support, balance, shock absorption, and propulsion. The plantar fascia, a thick fibrous aponeurosis extending from the medial calcaneal tubercle to the proximal phalanges, is the foot's primary passive stabilizer and plays a crucial role in maintaining the medial longitudinal arch. [2] It comprises medial, central, and lateral bands, with the central band bearing most tensile stress during weight-bearing activities. During walking and running, the plantar fascia functions as a dynamic stabilizer and is therefore vulnerable to repetitive strain and injury. [2]

Biomechanically, the plantar fascia serves as a shock absorber and energy-conserving structure. Excessive loading may lead to microtears and degenerative changes. [2] Although previously regarded as an inflammatory disorder, histological studies have shown that chronic plantar fasciitis is primarily degenerative, characterized by collagen disorganization, fibroblast proliferation, myxoid degeneration, and minimal inflammatory infiltration. Lemont et al. described this process as plantar fasciosis, emphasizing its degenerative nature. [2] This understanding has significantly influenced contemporary diagnosis and treatment approaches. [17]

Clinically, plantar fasciitis presents as sharp heel pain, particularly during the first steps in the morning or after prolonged inactivity. Symptoms may lessen temporarily with activity but typically worsen following prolonged standing, walking, or exercise. Localized tenderness at the medial calcaneal tubercle is common. [18]

The etiology of plantar fasciitis is multifactorial, involving mechanical, anatomical, occupational, and environmental factors. Repetitive tensile stress causes microscopic tears, leading to tissue degeneration, chronic pain, collagen breakdown, and reduced elasticity. [7] Intrinsic risk factors include obesity, elevated body mass index, limited ankle dorsiflexion,

Achilles tendon tightness, calf muscle stiffness, pes planus, pes cavus, and altered gait mechanics. [8] Individuals with restricted dorsiflexion often compensate through excessive subtalar pronation, increasing plantar fascia stress. Likewise, excess body weight increases compressive and tensile forces on the foot. [7]

Foot posture abnormalities also contribute to plantar fascia loading. Individuals with pes planus tend to overpronate, whereas those with pes cavus have reduced shock-absorbing capacity. Both conditions increase mechanical stress and the risk of heel pain. [9] Therefore, assessment of foot posture is an important component of plantar fasciitis evaluation.

The consequences of plantar fasciitis extend beyond localized heel pain. Chronic symptoms may impair gait, balance, physical activity, and functional independence. To avoid pain, patients often develop compensatory movement patterns that may increase stress on the ankle, knee, hip, and lower back. [10] Quality of life may be adversely affected, with limitations in daily activities, recreational participation, and occupational performance.

From an occupational perspective, plantar fasciitis may reduce productivity and work efficiency. Workers experiencing heel pain often require more rest breaks and may struggle to perform physically demanding tasks. [11] The financial burden includes physician consultations, imaging, physiotherapy, medications, orthotic devices, and surgical interventions, as well as indirect costs related to absenteeism, presenteeism, and reduced productivity.

Evidence suggests that ergonomic interventions such as anti-fatigue mats, supportive footwear, orthotic inserts, scheduled rest breaks, stretching programs, and employee education can reduce lower-limb discomfort among workers who stand for prolonged periods. [6] These measures may be particularly valuable in occupations exposed to continuous biomechanical stress.

Extrinsic risk factors include prolonged standing, repetitive walking, inappropriate footwear, hard walking surfaces, insufficient recovery periods, and sustained weight-bearing occupational activities. [4–6] The Windlass Mechanism is central to plantar fascia function. During hallux dorsiflexion, the plantar fascia tightens, elevating the medial longitudinal arch and converting the foot into a rigid lever for propulsion. [20] Dysfunction of this mechanism may increase plantar fascia stress and contribute to pathology.

Occupational health research consistently demonstrates a strong association between prolonged standing and musculoskeletal disorders. Prolonged standing increases muscle fatigue, joint loading, connective tissue stress, and circulatory impairment. [6] Workers who stand for extended periods frequently report discomfort in the feet, knees, hips, and lower back.[4]

High-risk occupations for plantar fasciitis include nursing, manufacturing, retail, food service, and hospitality. Bhoir et al. reported a 21% prevalence among nurses, highlighting the role of prolonged standing in disease development. Studies involving pharmacists and security guards have similarly demonstrated elevated prevalence rates associated with occupational standing and walking demands. [14] [15]

Chefs represent a unique occupational group within the hospitality sector. Their duties require prolonged standing, repetitive walking, bending, turning, and lower-limb activity within confined workspaces. Commercial kitchens often involve shifts lasting eight to twelve hours with minimal opportunities for rest, exposing chefs to sustained plantar fascia loading and increasing the likelihood of musculoskeletal disorders.

Kitchen flooring is another important factor. Most commercial kitchens utilize ceramic tile, concrete, or stone surfaces that provide little shock absorption, thereby increasing ground reaction forces transmitted through the lower limbs. [4] Prolonged exposure to hard flooring may accelerate cumulative microtrauma within the plantar fascia.

Footwear also influences plantar fascia stress. Although slip-resistant shoes reduce workplace injury risk, they may not provide adequate cushioning, arch support, or shock absorption. Inappropriate footwear remains a major modifiable risk factor for plantar heel pain. [9] Proper footwear and orthotic support may improve plantar fascia function and reduce mechanical stress. [18]

Recent studies highlight the prevalence of musculoskeletal disorders among chefs. Aali et al. reported calf muscle tightness in 83.3% of chefs and hamstring tightness in 46.3%. sixteen Such muscular tightness can alter lower-limb biomechanics and increase strain on the plantar fascia. Similarly, Iqbal et al. identified a high prevalence of musculoskeletal complaints among restaurant workers, particularly involving the lower back, knees, and lower limbs, suggesting substantial occupational musculoskeletal strain.

Chronic plantar fasciitis can impair mobility, productivity, and overall quality of life. Persistent symptoms may interfere with occupational duties, increase absenteeism, and necessitate workplace modifications. The condition also imposes substantial healthcare costs related to consultations, imaging, physiotherapy, orthotic devices, corticosteroid injections, and surgical procedures. Tong and Furia reported considerable annual healthcare expenditures associated with plantar fasciitis treatment in the United States. [11]

Despite growing awareness of occupational musculoskeletal disorders, research specifically examining plantar fasciitis among chefs remains limited. Most epidemiological investigations have focused on nurses, pharmacists, security guards, factory workers, and the general population. [13–15] Nordin et al. highlighted the high prevalence of musculoskeletal disorders among service workers, yet chef-specific evidence remains scarce.

Early diagnosis and intervention are essential for preventing long-term disability. Diagnostic tools such as the Weight-Bearing and Non-Weight-Bearing Windlass Tests are commonly used in clinical assessment. [10] The Foot Function Index and Numerical Pain Rating Scale provide quantitative measures of symptom severity and functional limitation.

Anti-fatigue mats deserve particular attention because they reduce lower-limb fatigue, improve comfort, and decrease perceived musculoskeletal discomfort during prolonged standing.[6] Physiotherapy also plays a key role in prevention and management through stretching, strengthening, manual therapy, orthotic prescription, taping, gait retraining, and ergonomic education.[19] Regular stretching of the plantar fascia, Achilles tendon, gastrocnemius, and soleus muscles has been shown to improve flexibility and reduce symptoms.

Given the prolonged standing hours, repetitive walking, demanding flooring conditions, footwear requirements, and high prevalence of lower-limb musculoskeletal disorders among chefs, this occupational group may be at increased risk of developing plantar fasciitis. However, epidemiological evidence remains limited.

The present study aims to determine the prevalence of plantar fasciitis among professional chefs working in the hotel industry. The findings may provide valuable insights into occupational risk factors, support the development of preventive strategies, and contribute to the growing body of knowledge on occupational musculoskeletal health. Furthermore, the results may assist physiotherapists, employers, and occupational health professionals in designing evidence-based interventions to reduce plantar fascia-related disorders among chefs.

METHODOLOGY

Materials:

Consent Form, Data collection sheet, Numerical pain rating scale, Foot Function Index. An Observational Study was conducted at Kolhapur on Individuals currently working as chef. The Sample Size was 82. A non-probability sampling method was used to allocate the participants. The study was conducted for a duration of Study Duration 1 year 6 months. After getting ethical approval from Institutional Ethics Committee study was started the participants were selected according to the inclusion and exclusion criteria.

Inclusion Criteria: Individuals currently working as chef, Participants of age between 20-60, Minimum 1 year of work experience as a chef, At least 5 hours of duty every day, Participant who are willingly participate, Participants of all the genders.

Exclusion Criteria: Preexisting foot conditions or deformity, Recent injuries, Non-chef kitchen workers, Pregnancy.

PROCEDURE

The study protocol was presented for approval in front of the institutional ethical committee and protocol committee of D. Y. Patil Education Society, Kolhapur. After the approval from committee field work was started. Study of Prevalence of Plantar Fasciitis among Chefs in Hotel Industry is an observational study which was performed accordingly. A brief knowledge about the whole research was given to the Chefs. A written consent form was taken from the participants that they were willing to participate in this study. Participants for study were selected based on the inclusion criteria and exclusion criteria.

Participants were first provided with the data collection sheet including their personal details and study related question's. A total of 82 individuals were randomized into a group, according to inclusive and exclusive criteria. Participants with positive Windlass Test were given the Numerical Pain Rating Scale (NPRS) to analyze the degree of pain.

Statistical analysis was done and results were obtatained.

RESULTS

A total of 82 chefs working in the hotel industry were selected for the study to determine the prevalence of plantar fasciitis. The age of the participants ranged from 21 to 60 years, with a mean age of 38.26 (±11.56) years. Among the participants, 59 were males and 23 were females. Male participants constituted 72% of the study population, while female participants accounted for 28%.

Parameters	**Overall, N= 121**	**Males, N= 59**	**Females, N= 23**
Age	38.26 ± 11.56	38.26 ± 11.56	38.26 ± 11.56
Working hours/day	8.03 ± 1.12	8.03 ± 1.12	8.03 ± 1.12

Table 1: Sociodemographic data and occupational characteristics.

Participants who were actively working as chefs in the hotel industry and willing to participate in the study were included. The assessment of plantar fasciitis was carried out using the Windlass Test in both weight-bearing and non-weight-bearing positions. Foot Function Index (FFI) was used to evaluate foot pain and functional disability, while the number of working hours per day was also recorded.

Weight-Bearing Windlass Test		**Overall, n=82**	
Positive		58 (70.7%)	
Negative		24 (29.3%)	

Table3. Weight-Bearing Windlass Test Findings

For the weight-bearing Windlass Test, 58 participants (70.7%) showed a positive result, whereas 24 participants (29.3%) had a negative result. The mean Foot Function Index score among participants with a positive weight-bearing Windlass Test was 0.58 (±0.04), while those with a negative test had a mean score of 0.21 (±0.11). This difference was found to be statistically significant ($p < 0.001$). The average working hours among participants with positive and negative weight-bearing Windlass Test results were 8.04 (±1.13) and 8.02 (±1.10) hours respectively, showing no statistically significant association ($p = 0.935$).

Non-Weight-Bearing Windlass Test	**Overall, n=82**
Positive	56 (68.3%)
Negative	26 (31.7%)

Table 4. Non-Weight-Bearing Windlass Test Findings

For the non-weight-bearing Windlass Test, 56 participants (68.3%) demonstrated a positive result, while 26 participants (31.7%) had a negative result. The mean Foot Function Index score for participants with a positive test was 0.59 (±0.05), whereas participants with a negative test had a mean score of 0.24 (±0.14). This difference was statistically significant ($p < 0.001$). The average working hours

among positive and negative participants were 8.03 (±1.14) and 8.06 (±1.07) hours respectively, with no significant association observed (p = 0.908).

Outcome Measure	Mean	S.D.	P-value
POSITIVE Windlass test	58.48%	4.73 %	<0.001*
NEGATIVE Windlass test	21.21%	11.65%	

Table 5. Mean and standard deviation of Foot Function Index according to Weight-Bearing Windlass Test.

Outcome Measure	Mean	S.D.	P-value
POSITIVE Windlass test	58.70%	4.65 %	<0.001*
NEGATIVE	23.62%	14.06%	

Table 6. Mean and standard deviation of Foot Function Index according to Non-Weight-Bearing Windlass Test.

The findings indicate a high prevalence of plantar fasciitis among chefs, as evidenced by the large proportion of positive Windlass Test results and significantly higher Foot Function Index scores among affected participants.

DISCUSSION

The present study was conducted to determine the prevalence of plantar fasciitis among professional chefs working in the hotel industry. Plantar fasciitis is one of the most common causes of heel pain and is characterized by inflammation and degeneration of the plantar fascia due to repetitive stress and excessive loading. Professional chefs constitute an occupational group that is particularly vulnerable to foot-related musculoskeletal disorders because their work demands prolonged standing, continuous walking, repetitive weight-bearing activities, and long working hours on hard kitchen surfaces. These occupational factors place repeated strain on the plantar fascia, thereby increasing the risk of developing plantar fasciitis.

A total of 82 chefs were included in the study. The diagnosis of plantar fasciitis was assessed using the Weight-Bearing Windlass Test and Non-Weight-Bearing Windlass Test, while the severity of foot-related disability and functional limitation was evaluated using the Foot Function Index (FFI). The findings of the study demonstrated a substantial prevalence of plantar fasciitis among chefs. Out of 82 participants, 58 participants (70.7%) showed positive findings on the Weight-Bearing Windlass Test, whereas 24 participants (29.3%) tested negative. Similarly, the Non-Weight-Bearing Windlass Test was positive in 56 participants (68.3%) and negative in 26 participants (31.7%). These findings indicate that more than two-thirds of the participating chefs exhibited clinical signs suggestive of plantar fasciitis.

The Foot Function Index scores further supported these findings. Participants with positive Weight-Bearing Windlass Test results demonstrated significantly higher FFI scores (0.58 ± 0.04) compared to those with negative test findings (0.21 ± 0.11).

Similarly, participants with positive Non-Weight-Bearing Windlass Test results showed higher FFI scores (0.59 ± 0.05) than those with negative findings (0.24 ± 0.14). Statistical analysis revealed a highly significant association between positive Windlass Test findings and elevated FFI scores ($p < 0.001$). These results suggest that participants diagnosed with plantar fasciitis experienced greater pain, disability, and limitations in daily functional activities compared to those without plantar fascia involvement.

The findings of the present study are consistent with previous literature that has identified prolonged standing as a major risk factor for plantar fasciitis. Riddle et al. reported that occupations involving prolonged weight-bearing activities significantly increase the risk of developing plantar fasciitis. Similarly, Irving et al. identified occupational standing, prolonged walking, and repetitive loading of the foot as important contributors to plantar heel pain. Professional chefs often spend eight to ten hours standing during food preparation, cooking, plating, and service activities. Continuous exposure to these physical demands may lead to repetitive microtrauma within the plantar fascia, eventually resulting in inflammation and degenerative changes.

The prevalence observed in the present study is comparable to findings reported in other occupational groups exposed to prolonged standing. Previous studies have shown that healthcare workers, factory workers, teachers, retail workers, and hospitality employees frequently report foot pain and plantar fascia-related disorders due to prolonged periods of standing. Similar occupational exposures are present among chefs, who often work in fast-paced environments with minimal opportunities for rest. Such conditions contribute to cumulative mechanical stress on the plantar fascia over time.

One important observation from the present study was that working hours did not demonstrate a statistically significant association with Windlass Test findings. The average working hours among participants with positive and negative Weight-Bearing Windlass Test results were 8.04 ± 1.13 and 8.02 ± 1.10 hours respectively, while participants with positive and negative Non-Weight-Bearing Windlass Test findings reported average working hours of 8.03 ± 1.14 and 8.06 ± 1.07 hours respectively. This finding suggests that although prolonged standing is a recognized risk factor, the occurrence of plantar fasciitis may also be influenced by additional factors such as footwear quality, body mass index, foot posture, arch characteristics, floor surface, years of occupational exposure, and individual biomechanical variations.

The Windlass Test played a crucial role in identifying plantar fascia pathology in this study. The Weight-Bearing Windlass Test is considered highly functional because it reproduces the biomechanical loading conditions encountered during standing and walking. Dorsiflexion of the great toe tightens the plantar fascia through the windlass mechanism, thereby reproducing symptoms in individuals with plantar fascia pathology. The high percentage of positive Windlass Test findings observed in this study reflects the significant burden of plantar fascia dysfunction among chefs. The consistency between positive Windlass Test findings and elevated Foot Function Index scores further strengthens the validity of these results.

Another important aspect of this study is the assessment of foot function using the Foot Function Index. The FFI is a validated and reliable outcome measure that evaluates pain intensity, disability, and activity limitation associated with foot disorders. Participants with positive Windlass Test findings demonstrated significantly higher FFI scores, indicating that plantar fasciitis not only causes heel pain but also adversely affects functional activities such as walking, standing, climbing stairs, and performing occupational tasks. Reduced foot function can negatively impact work efficiency, productivity, and overall quality of life among chefs.

The occupational environment of hotel kitchens may further contribute to the development of plantar fasciitis. Kitchen staff frequently work on hard concrete or tiled surfaces, which provide limited shock absorption during standing and walking. Repetitive loading of the heel and plantar fascia on such surfaces can increase tissue stress and accelerate the development of plantar fascia pathology. Additionally, the use of inappropriate footwear lacking adequate arch support and cushioning may further increase the risk of heel pain and plantar fasciitis.

The findings of the present study emphasize the importance of preventive and rehabilitative interventions in this occupational group. Workplace modifications such as anti-fatigue floor mats, appropriate footwear with arch support, scheduled rest breaks, and ergonomic adjustments may help reduce excessive loading of the plantar fascia. Physiotherapy interventions including plantar fascia stretching exercises, calf muscle stretching, strengthening of intrinsic foot muscles, manual therapy, taping techniques, and education regarding proper foot care

may also be effective in reducing symptoms and improving functional outcomes.

A potential limitation of the present study is that it was conducted within a specific geographical region and involved a relatively limited sample size. Factors such as body mass index, foot posture, footwear characteristics, and duration of occupational exposure were not extensively analyzed. Future studies should include larger populations from different regions and investigate additional risk factors that may contribute to the development of plantar fasciitis among chefs. The use of diagnostic imaging techniques such as ultrasonography could also provide further confirmation of plantar fascia pathology.

Overall, the findings of this study indicate a high prevalence of plantar fasciitis among professional chefs working in the hotel industry. The significant proportion of positive Windlass Test findings and elevated Foot Function Index scores suggest that plantar fasciitis represents an important occupational health concern in this population. The results highlight the need for early screening, preventive measures, ergonomic interventions, and physiotherapy management to reduce the burden of plantar fasciitis and improve the functional well-being of chefs. This study contributes valuable information regarding the occupational impact of plantar fasciitis and may assist healthcare professionals and employers in developing effective strategies for prevention and management within the hotel industry.

the Non-Weight-Bearing Windlass Test. These findings indicate that plantar fasciitis is a common musculoskeletal condition among chefs and may be associated with the occupational demands of prolonged standing, continuous walking, and repetitive weight-bearing activities.

Furthermore, participants with positive Windlass Test findings demonstrated significantly higher **Foot Function Index (FFI) scores** compared to those with negative findings, indicating greater pain, disability, and functional limitation. This suggests that plantar fasciitis not only affects foot health but also has a considerable impact on daily activities and occupational performance.

CONCLUSION

The goal of our study was to investigate the prevalence of plantar fasciitis among professional chefs working in the hotel industry. The results highlight a substantial occurrence of plantar fasciitis among chefs, with **70.7% of participants showing positive findings on the Weight-Bearing Windlass Test and 68.3% showing positive findings on the Non-Weight-Bearing Windlass Test**. These findings indicate that plantar fasciitis is a common musculoskeletal condition among chefs and may be associated with the occupational demands of prolonged standing, continuous walking, and repetitive weight-bearing activities.

Furthermore, participants with positive Windlass Test findings demonstrated significantly higher **Foot Function Index (FFI) scores** compared to those with negative findings, indicating greater pain, disability, and functional limitation. This suggests that plantar fasciitis not only affects foot health but also has a considerable impact on daily activities and occupational performance.

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