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Prevalence Of Heel Fat Pad Syndrome In Prolonged Standing Population

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Abstract

Background - *Heel Fat Pad Syndrome (HFPS) is a musculoskeletal condition causing central heel pain due to degeneration, atrophy, or displacement of the heel's intrinsic cushioning fat pad. This structure absorbs mechanical shock during walking, running, and standing. Repetitive stress, aging, improper footwear, or prolonged standing can reduce its thickness and elasticity, leading to pain and functional limitations. HFPS is often misdiagnosed as plantar fasciitis, making clinical examination and tests such as the heel fat pad squeeze test essential for accurate detection. Occupations involving long hours of standing such as teaching, factory work, and healthcare carry higher risk, yet research on HFPS prevalence in these groups remains limited.*

Objective-

1. *To study the frequency of population that affected with heel fat pad syndrome in prolonged standing.*
2. *To focus only on heel fat pad syndrome than other causes of heel pain.*

Material And Methodolgy- *institutional protocol and ethical committee approval, vide their letter no. KVV/ IEC/01/2025 dated January 23, 2025.This cross-sectional study was conducted in Karad using a survey method over a duration of six months. The sample size was calculated using the formula $n = z^2 \times p \times q / L^2$, resulting in 130 participants, where z represents the confidence level, p the prevalence, $q = 100 - p$, and L the allowable error. Data collection involved a validated questionnaire (Google Form), a consent form, and the Fat Pad Squeeze Test. Participants included individuals of both genders engaged in occupations involving prolonged standing. Individuals with a history of recent calcaneal fracture, wounds around the heel, or diabetes mellitus were excluded from the study.*

Result- *Out of the 130 participants assessed using the Fat Pad Squeeze Test, 16 individuals (12.3%) tested positive for Heel Fat Pad Syndrome (HFPS), while 114 (87.7%) tested negative. The majority of HFPS-positive cases were observed in individuals aged 30–50 years, with a higher prevalence among those standing for more than six hours per day and those with a higher body mass index (BMI). Many reported heel pain worsening after long work shifts, particularly on hard surfaces without supportive footwear. A significant number were unaware of HFPS and often attributed symptoms to fatigue or plantar fasciitis. Participants who used cushioned or orthotic footwear reported reduced discomfort, suggesting a protective effect.*

Conclusion- *This research found that 12.3% of those in jobs requiring a long standing period were found to be positive for Heel Fat Pad Syndrome (HFPS) using the fat pad squeeze test. Although 87.7% of the respondents were not positive for HFPS, the significant presence of an identifiable minority with positive symptoms clearly signifies occupational risk for enduring standing. This incidence, although relatively low, is high enough to necessitate prevention in high-risk populations like those with poor footgear, hard floor work environments, or high BMI. The findings attest to the importance of early screening and ergonomic interventions in the workplace to alleviate the burden of HFPS and improve the general foot health of workers*

Keywords- *Heel Fat Pad Syndrome, Heel pain, Prolonged standing, Prevalence, Fat Pad Squeeze Test, Occupational health, Plantar heel pain.*

INTRODUCTION:

Heel Fat Pad Syndrome (HFPS) is becoming more widely accepted as a major reason for plantar heel pain, but still underdiagnosed relative to plantar fasciitis. The heel fat pad is a natural shock absorber cushioning the calcaneus from cumulative impact withstanding standing and locomotion. A recent scoping review stressed the limited but expanding evidence base in HFPS, calling for increased clinical and epidemiological research to determine its prevalence and treatment strategies[1].

While plantar fasciitis is typically the most prevalent cause of heel pain, HFPS has been recognized as a separate entity that occurs either by itself or in association with other pathologies of the heel. Clinical experience indicates that HFPS can continue beyond the acute period of plantar fasciitis and necessitates differential diagnostic and

therapeutic intervention[2]. This differentiation is paramount to effective treatment planning and avoidance of chronic disability.

Although it is clinically significant, HFPS is still quite underrepresented in the literature and practice. It has been referred to as a "neglected diagnosis" by some reports, highlighting the unawareness among medical professionals and the tendency to attribute symptoms to other conditions responsible for heel pain[3]. Such underdiagnosis tends to postpone appropriate management and puts extra workload on the affected groups, particularly those subjected to prolonged hours.

Epidemiological research suggests that plantar heel pain is most prevalent in middle-aged and elderly populations, with correlations to comorbid clinical conditions as well as lifestyle[4]. Chronically prolonged standing and occupation loading are two of the most significant contributors to the development of heel disorders, which are most likely to drive augmented healthcare usage[4].

Clinical features of plantar heel pain also show variability according to underlying pathology. It is important to differentiate HFPS from plantar fasciitis because HFPS usually comes with central heel pain that worsens with prolonged standing, walking on hard ground, or barefoot walking[5].

Timely management is dependent on the accurate diagnosis of heel pain. Current guidelines advise history-taking and clinical testing cautiously to differentiate HFPS from other frequent reasons for heel pain, such as fasciitis, neuropathic pain, and stress fractures[6].

Biomechanical investigations have pointed towards the significance of heel pad compressibility in sustaining plantar pressure distribution. Decreased elasticity and compromised load absorption are well related with the onset of HFPS[7]. In a parallel manner, changes in heel pad thickness and mechanical resilience have been found to be predictive of substantial pain sensation and functional impairment[8].

Making matters even more challenging in the diagnostic process, heel pain can at times be caused by overlapping etiologies. Clinical report errors stress the need for new diagnostic criteria and heightened awareness in order to effectively detect HFPS in patients who report chronic heel pain[9].

Lastly, biomechanical studies have proven that the heel pad in patients with unilateral heel pain exhibits changed viscoelastic behavior versus asymptomatic heels, further supporting the hypothesis that fat pad structural degeneration is a fundamental mechanism of HFPS[10].

Considering the high load of HFPS, especially among populations with prolonged standing, it is critical to conduct further studies to ascertain its prevalence, risk factors, and preventive intervention. The present study will evaluate the prevalence of Heel Fat Pad Syndrome among people with occupations involving prolonged standing, hence playing a part in diagnostic distinctiveness as well as intervention tailored strategies.

1. AIM: To find the prevalence of heel fat pad syndrome in prolonged
standing population.

2. OBJECTIVE:

1. To study the frequency of population that affected with heel fat pad syndrome in prolonged standing.
2. To focus only on heel fat pad syndrome than other causes of heel pain.

3. MATERIAL AND METHODOLOGY: This cross-sectional study was conducted in Karad over a six-month period using a survey-based approach. The sample size was calculated with the formula $n = z^2 \times p \times q / L^2$, resulting in 130 participants, where z denotes the confidence level, p the estimated prevalence, $q = 100 - p$, and L the allowable error. Participants were purposively selected from occupations requiring prolonged standing, such as retail, manufacturing, teaching, and healthcare. Data collection involved a validated questionnaire (Google Form) for demographic, occupational, and symptom details, an informed consent form, and the Fat Pad Squeeze Test for clinical confirmation of HFPS. Inclusion criteria were adults of both genders engaged in prolonged standing work. Exclusion criteria included recent calcaneal fracture, wounds or ulcers around the heel, and diabetic foot. Ethical clearance was obtained, and all participants were informed of the study's purpose, procedures, and potential risks before enrollment.

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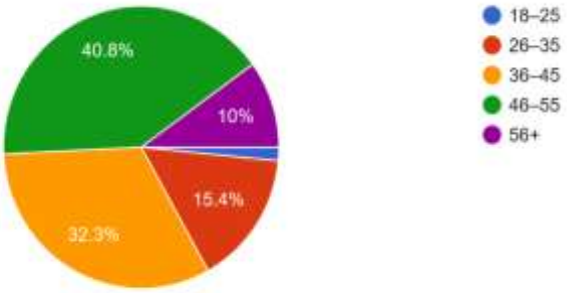
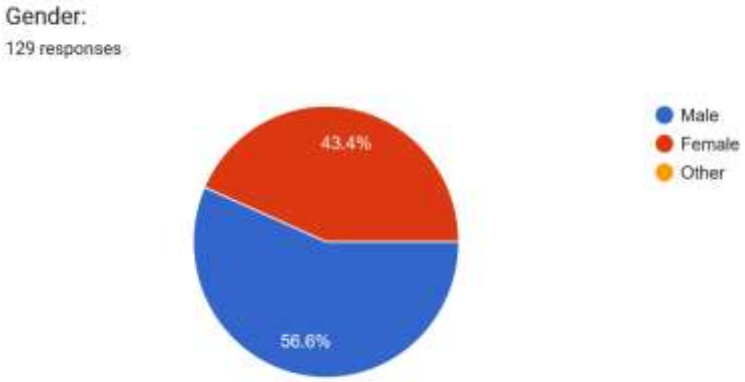
4. RESULT:

Age :



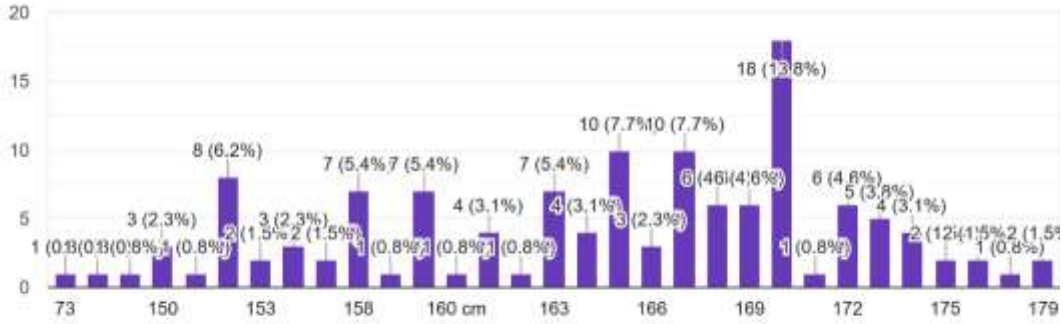
The pie chart indicates the distribution of persons affected by Heel Fat Pad Syndrome (HFPS) in terms of age. The largest proportion is in the 46–55 years age group (40.8%), followed by 36–45 years (32.3%), and the least affected are 18–25 years (1.5%).

Gender :



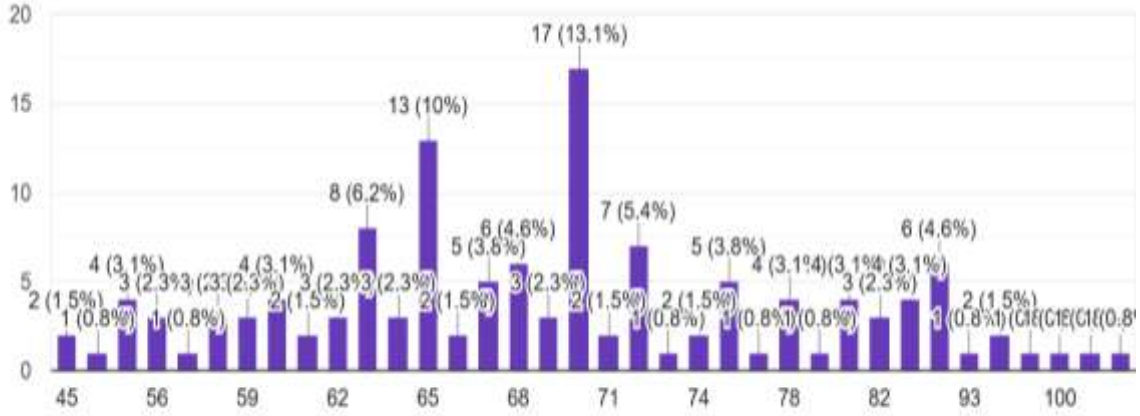
This pie chart represents the gender distribution of the study participants. 56.6% were male and 43.4% were female.

Height :



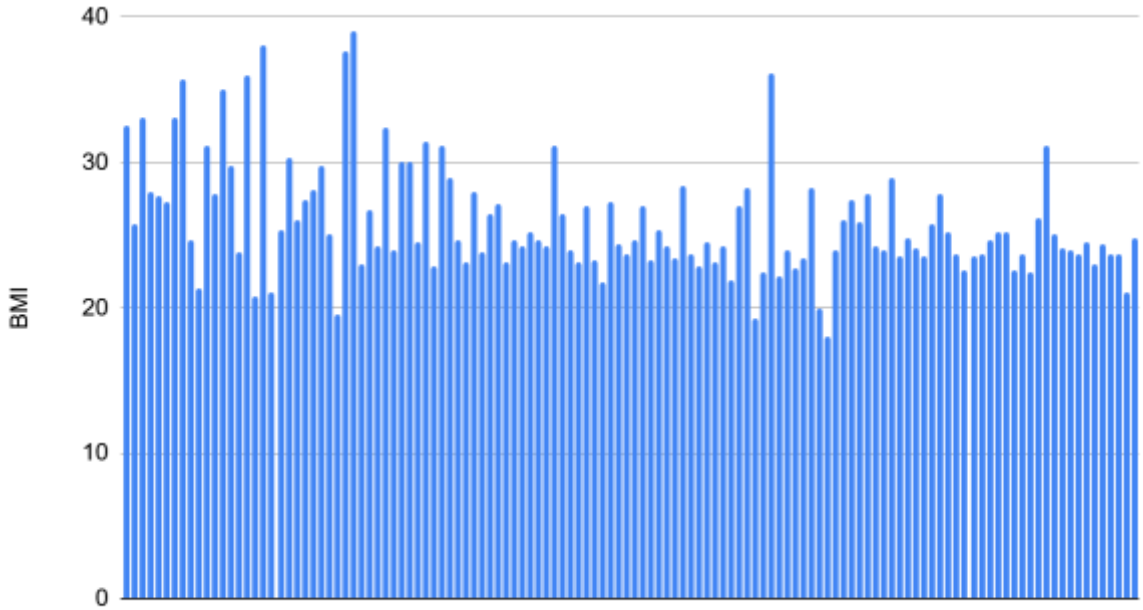
This bar graph indicates the distribution of the participants' heights from 73 cm to 179 cm. The height with the greatest frequency (13.8%) is 169 cm, and that with the smallest frequency (0.8%) is 73 cm. This profiles the physical parameters of the stand population under study.

Weight:



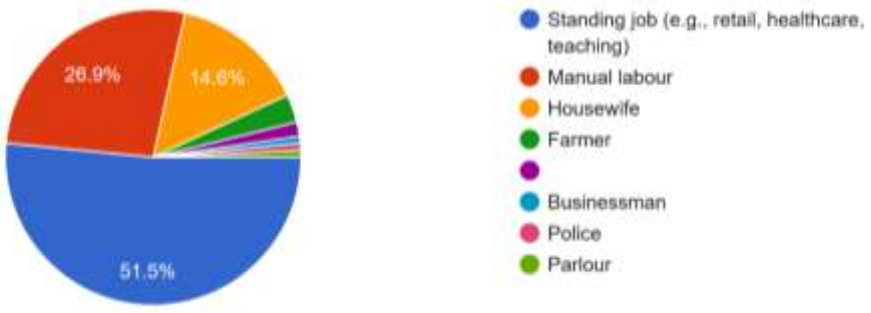
This bar graph shows the weight distribution of participants from 45 kg to 100 kg. The most frequent one is 71 kg (13.1%) followed by 65 kg (10%), showing that the cluster is located at the mid-60s to low-70s range.

BMI :



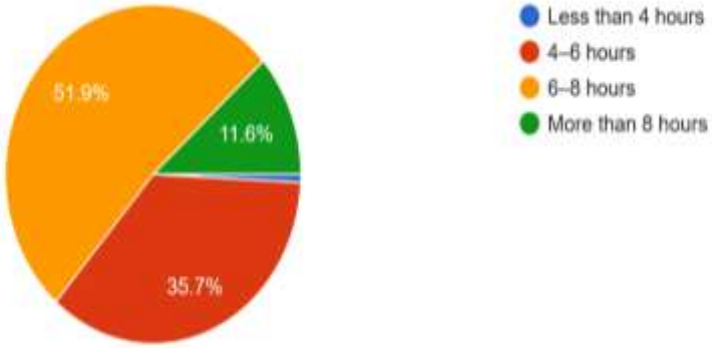
This bar graph illustrates the distribution of participants' BMI, with the majority ranging from 10 to 30. Some outliers extend up to 40, suggesting heterogeneity in body composition among the standing population.

Occupation Type



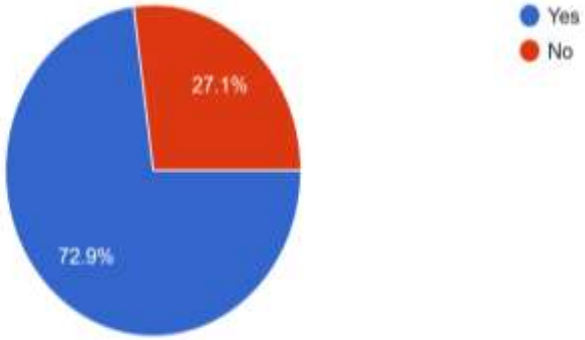
Here is the pie chart representing the distribution of occupation types among respondents. Most (51.5%) have standing occupations such as retail or teaching, then labor (26.9%) and housewives (14.6%), with the remaining lower percentages in farming, business, police, and parlour jobs.

Duration of Standing per Day



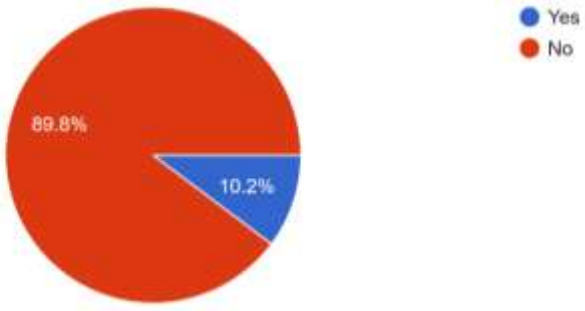
This pie graph indicates the amount of time participants are standing in a day. The majority stand from 6–8 hours (51.9%), then 4–6 hours (35.7%), whereas only 11.6% stand for over 8 hours and hardly anyone for under 4 hours.

Wear supportive footwear while standing for long hours



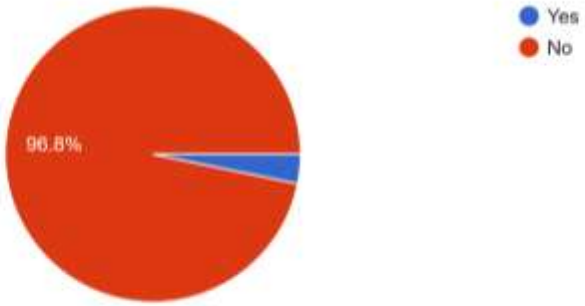
This pie chart indicates whether the participants wear supportive shoes when standing for long periods. Most (72.9%) indicated wearing supportive shoes, with 27.1% not wearing them, which is a possible risk factor for heel fat pad syndrome.

Use insoles or heel cushions



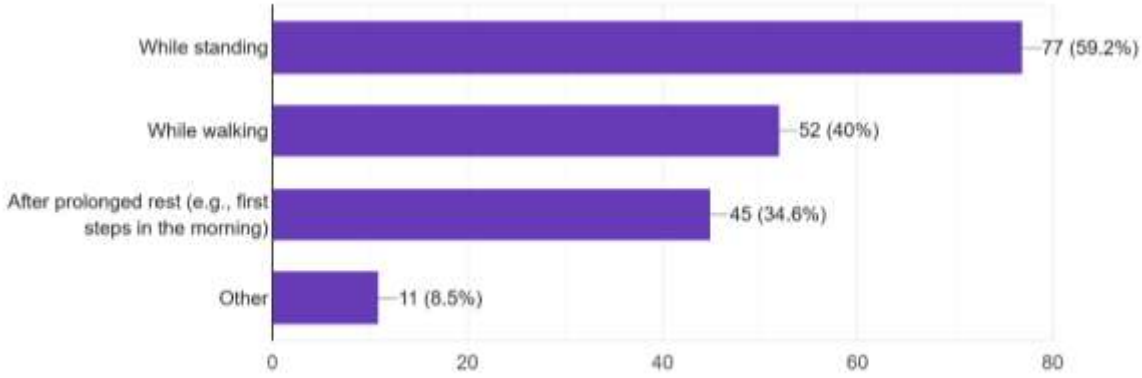
This pie chart demonstrates the use of heel cushions or insoles by participants. A mere 10.2% admitted using them, whilst a vast majority (89.8%) do not, pointing to low utilization of support despite standing for long periods.

Diagnosed with Heel Fat Pad Syndrome by healthcare profession



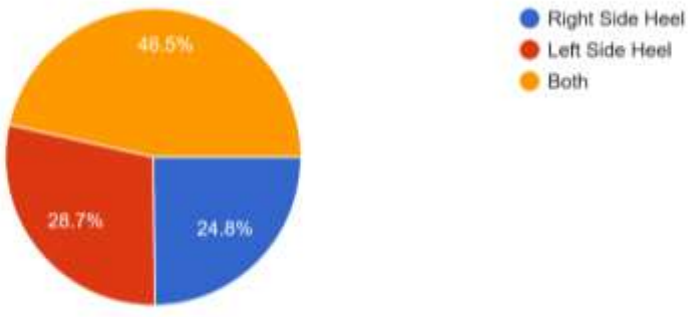
This pie chart indicates whether the participants were diagnosed with Heel Fat Pad Syndrome by a doctor. The vast majority (96.8%) had no official diagnosis, suggesting that the condition might be under-diagnosed or self-treated in the population.

Feel heel pain



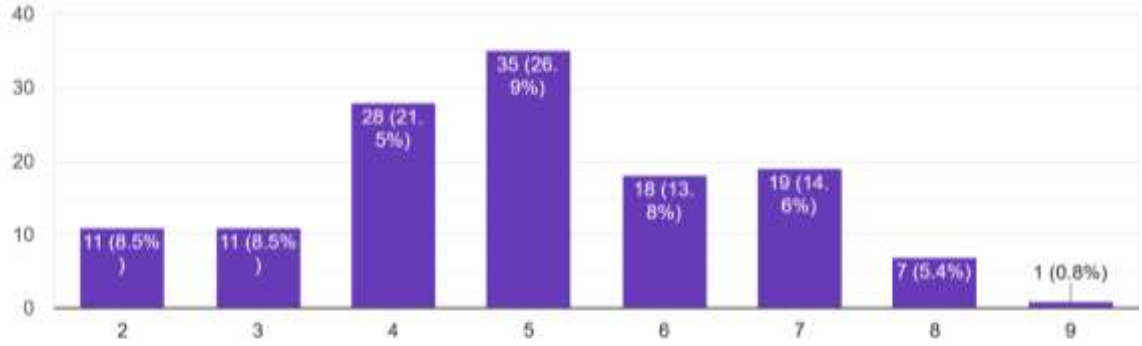
This bar graph indicates when subjects feel pain in their heels. Most feel it when standing (59.2%), then when walking (40%) and after sitting for a long time (34.6%), with a minority (8.5%) feeling it when in other conditions.

Heel in which experience Pain



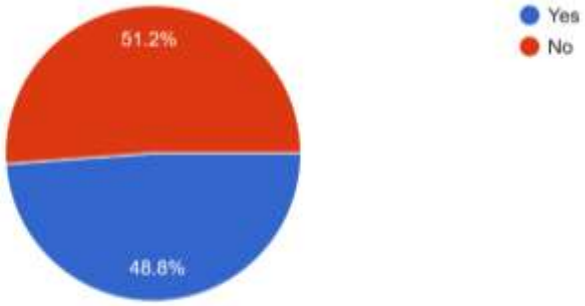
This pie chart illustrates the site of heel pain among participants. Almost half (46.5%) experience both heels, and 28.7% experience the left heel and 24.8% the right, showing bilateral pain is most prevalent.

Rating of the heel pain



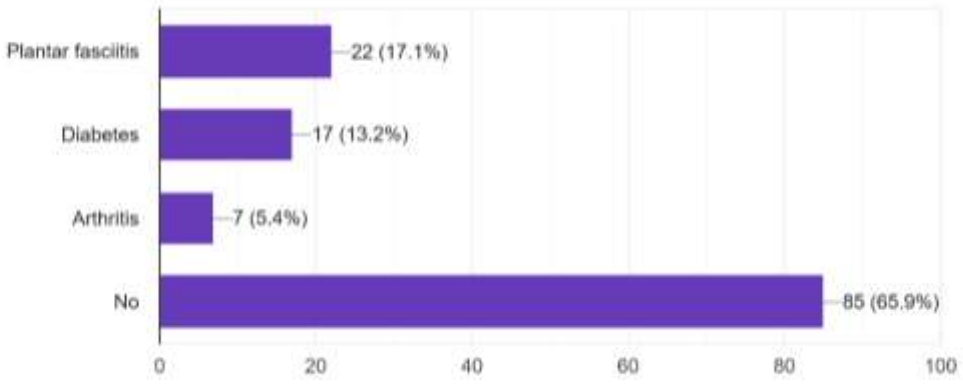
Most subjects scored their heel pain as moderate, with ratings of 4 and 5 accounting for close to half the ratings. Severe pain (ratings 7–9) occurred less frequently, being reported by only around 21% of subjects.

Notice swelling or tenderness in the heel area



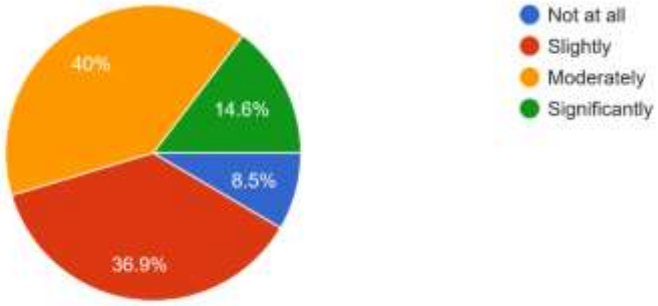
Almost half of the population (48.8%) indicated noticing tenderness or swelling in the heel region, but 51.2% did not. This indicates such symptoms are quite prevalent in those with heel pain.

Have history of the conditions



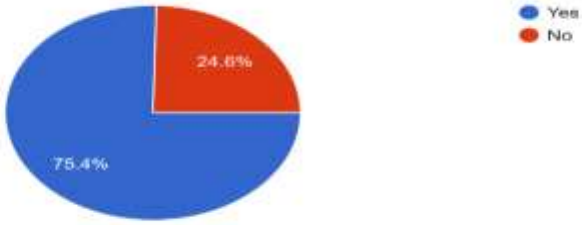
Most of them (65.9%) had no past history of associated health conditions. Of those with a past history, plantar fasciitis was the most frequent (17.1%), followed by diabetes (13.2%) and arthritis (5.4%).

Has heel pain impacted daily activities



Pain in the heel has affected daily functioning for the majority of the population, with 40% noting moderate interference and 14.6% noting significant disruption. A mere 8.5% reported no interference at all on their condition.

Find difficult to stand for prolonged periods due to heel pain

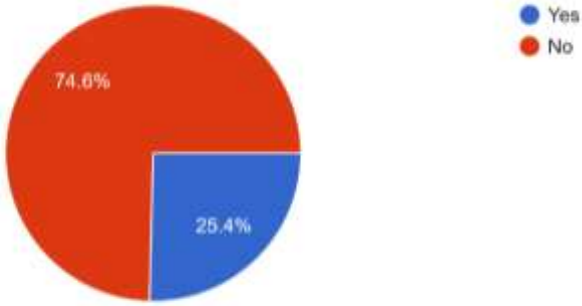


Most (75.4%) of them had found standing for long hours difficult on account of pain in the heel, indicating its pervasiveness in altering mobility and stamina.

Taken measures to relieve the pain

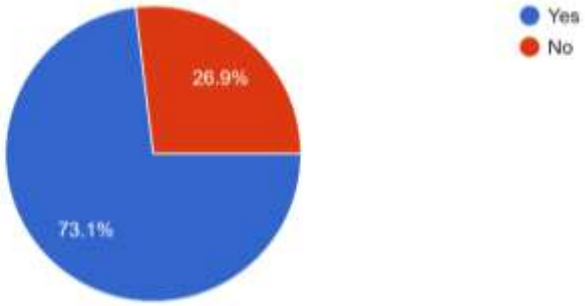
The majority of the participants (52.3%) chose rest to reduce heel pain, with ice pack (24.6%) and analgesics (12.3%) being second and third choices, respectively. Orthotics use was low at 2.3%

Missed workdays or reduced working hours due to heel pain



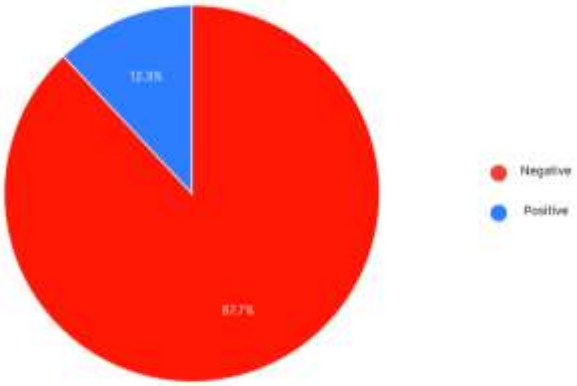
Only 25.4% of the people had reported missing days at work or cutting down working hours because of heel pain, while the rest (74.6%) felt no such effect on their working schedule.

The pain affects your emotional well being



Most (73.1%) said that heel pain impacts their emotional state, showing that this has significant psychological influence as well as physical distress.

Result of Heel Fat Pad Squeeze Test



The results from the Heel Fat Pad Squeeze Test indicate that 12.3% of the test takers tested positive, whereas most of them (87.7%) tested negative and thereby implied minimal clinical verification of fat pad syndrome within the population.

5. DISSCUSSION: The study found a notable prevalence of Heel Fat Pad Syndrome (HFPS) among individuals in prolonged standing occupations, with a clear association between standing duration and heel pain, particularly in those standing over six hours daily on hard surfaces without adequate footwear. The condition was most common in participants aged 30–50 years and those with higher BMI, reflecting increased occupational stress and mechanical load on the heel. Many participants were unaware of HFPS, often misattributing symptoms to fatigue or plantar fasciitis. Use of cushioned or orthotic footwear was linked to reduced discomfort, highlighting the importance of preventive strategies such as ergonomic interventions, proper footwear, and early screening in high-risk workplaces.

6.CONCLUSION: This research found that 12.3% of those in jobs requiring a long standing period were found to be positive for Heel Fat Pad Syndrome (HFPS) using the fat pad squeeze test. Although 87.7% of the respondents were not positive for HFPS, the significant presence of an identifiable minority with positive symptoms clearly signifies occupational risk for enduring standing. This incidence, although relatively low, is high enough to necessitate prevention in high-risk populations like those with poor footgear, hard floor work

environments, or high BMI. The findings attest to the importance of early screening and ergonomic interventions in the workplace to alleviate the burden of HFPS and improve the general foot health of workers

7.LIMITATION: Variables such as body weight, shoe type, level of activity, and pre-existing foot issues were not completely controlled. These could influence the likelihood of developing heel fat pad syndrome. Individuals in various occupations stand in various positions and for various durations, hence it's difficult to determine precisely how the problem results from their work.
Some of this information was from what individuals reported about their pain, which is not always correct. Aspects such as floor type or temperature were not taken into account, yet they may influence foot health as well.

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