Prevalence and risk factors of plantar fasciitis among the population of Al Jouf region: a cross-sectional study

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ABSTRACT

Objective: The study aimed to evaluate the prevalence and risk factors of plantar fasciitis (PF) among the population of the Al Jouf region in Saudi Arabia.

Methods: This study employed a cross-sectional design and used data from a sample of 665 people living in the Al Jouf region of Saudi Arabia. After guaranteeing their confidentiality, the participants answered a validated self-administered questionnaire.

Results: The study primarily consisted of adults aged less than 40 years (63.3%, n = 421), with a predominance of females (58.6%, n = 390), majority of them were singles (50.4%, n = 335), with university education (72.0%, n = 479), and 42.3% (n = 281) were employed. The study established a 12% (n = 80) prevalence rate of PF among the population of Al Jouf, Saudi Arabia. In terms of comorbidities, 9.3% (n = 62) participants had obesity, while 8.3% (n = 55) had diabetes. Furthermore, tobacco use or diseases associated with tobacco use affected 3.3% (n = 22).

Conclusion: The study established a 12% prevalence rate of PF among the population of the Al Jouf region in Saudi Arabia. Comorbidities such as obesity, diabetes, hypertension, and cardiovascular illnesses were risk factors for the development of PF. PF was found to be more common in people who were 40-65 years old, obese, and employed in jobs that required 3-6 hours of standing or 3-12 hours of walking. Conversely, being a man was associated with a lower incidence of PF.

Keywords: Prevalence, risk factors, plantar fasciitis, Al Jouf, Saudi Arabia.

Introduction

Plantar fasciitis (PF) is a condition that causes heel pain and is considered to have an estimated prevalence of approximately 10% that contributes to a negative impact on peoples’ livelihood by affecting their quality of life [1,2] because walking is an essential aspect of daily life. The pain caused by PF has been related to changes in gait, deviation in stepping, and ultimately internal rotation of the tibia and femur and alteration of overall foot function [3]. Conventionally, PF was considered to emerge as a result of excessive tension that causes inflammation in the plantar fascia [4]. Currently, PF is now believed to be more of a degenerative process than an inflammatory condition, where shear stress is a crucial feature of pathogenesis [4].

In the United States, about 1 million patients attend outpatient clinics and hospitals each year to diagnose and treat PF, which is why it is considered an essential public health problem [5]. There are just a handful of studies conducted on the prevalence and risk factors of PF in Saudi Arabia, and those carried out were poorly investigated. Hence,
research conducted in Makkah, on 270 patients, showed that PF affects more than half of the patients who experience heel pain presented in healthcare facilities [6]. Some possible risk factors include obesity, prolonged standing, walking barefoot, wearing high-heeled shoes, flat feet, and lack of exercise.

However, there is a lack of studies that investigated the prevalence and risk factors of PF in Saudi Arabia especially in the Al Jouf region, which may influence effective prevention and management strategies that can be done. Therefore, this study aimed to evaluate the prevalence and risk factors of PF among the population of the Al Jouf region in Saudi Arabia. However, researching PF in Al Jouf is crucial to understanding the epidemiology, etiology, and prevention of this condition. Such research could also help raise awareness and educate the public and healthcare providers about PF and identify the gaps and challenges that need to be addressed. Ultimately, this study can improve the health and well-being of the people of Al Jouf who suffer from PF.

**Subjects and Methods**

This research used a cross-sectional study design and was conducted on the general population of the Al Jouf region of Saudi Arabia. The study was conducted between 25 October and November 10, 2023. This study included individuals of various age groups, genders, and occupations, representing the diversity of the population in Al Jouf. By targeting the general population, the study seeks to get insights into the prevalence and risk factors of PF in this specific region.

Participants included in this study met the following criteria including adult residents of the Al Jouf region, who were able to provide informed consent and were willing to complete the surveys/questionnaires related to PF. Furthermore, those with pain in the heel region were also included. However, individuals were excluded from the study if they were presented with the following conditions including living outside of the Al Jouf region, having a history of foot or lower limb trauma and surgery, having a history of inflammatory arthropathy (rheumatoid arthritis, systemic lupus atheromatous, and ankylosing spondylitis). All pregnant women were excluded.

A simple random sampling technique was used, and the individuals who had fulfilled the inclusion criteria participated in the study. This sampling technique ensures the representativeness of the study population and minimizes bias.

The study sample size was established based on the assumption of a 95% confidence level and a 5% margin of error, and applying the following formula to calculate the sample size: 
\[
n = \left( \frac{Z^2 \cdot p \cdot q}{E^2} \right),
\]
whereby, \(n\) is the sample size, and \(Z\) is 1.96 which is the Z-score that corresponds to 95% confidence and \(p\) is the expected prevalence of PF, and \(q = 1 - p\) (the complement of the expected prevalence) and \(E\) is the margin of error. Since there is no widely accepted estimate of the prevalence of PF in the population of Al Jouf, a conservative estimate of 50% was used. This means that half of the population might have the condition that was assumed. Using these assumptions and plugging the values into the formula, 
\[
n = (1.96^2 \cdot 0.5 \cdot 0.5)/0.05^2 = 384.16
\]
calculated. Therefore, the sample size for the study was set at least 384 participants, and the ample was rounded up to 400.

The data collection was conducted using valid questionnaires that were administered to the participants and were taken from a previous study that investigated the same objective in the Jazan region [7]. Surveys provide a structured approach for gathering information on various variables, including demographics, medical history, risk factors, and lifestyle factors associated with PF. The cross-sectional study design was employed to allow the data to be collected at a single point in time, to assess the prevalence and the association between variables.

The dataset was analyzed using SPSS version 26. The study utilized both descriptive statistics and inferential statistics. The qualitative data was expressed as a percentage. The distribution of frequency was used to define each variable. The univariate logistic regression was employed to identify factors that predicted the development of PF.

**Results**

A total of 665 participants completed the questionnaire. The majority of the participants (63.3%, \(n = 421\)) were aged less than 40 years. More than half of the participants (58.6%, \(n = 390\)) were females. In terms of marital status, most of them (50.4%, \(n = 335\)) were single. As for education level, the majority of the participants (72.0%, \(n = 479\)) had a university education (Table 1).

Considering their field of work, most of them (35.6%, \(n = 237\)) were teachers, while 14.3% (\(n = 95\)) worked in the healthcare sector. Regarding the number of hours required per day in their job while walking or standing, the majority (35.6%, \(n = 237\)) reported 3-6 hours, while 11.3% (\(n = 75\)) reported 6-12 hours. In addition, the majority (37.6%, \(n = 250\)) of the participants reported less than 3 hours per day of sitting as required in their jobs (Table 2).

Of the participants, 37.6% (\(n = 250\)) reported having inferior heel pain when awake or when bearing weight. Furthermore, 39.1% (\(n = 260\)) reported tightness and soreness in their heels after rising from bed in the morning or after spending a lot of time seated. When it came to morning discomfort, the majority (\(n = 425\)) reported experiencing sub-calcaneal pain, or pain in the plantar part of the foot. Moreover, 12% (\(n = 80\)) of individuals had received a PF diagnosis in the past. As for those who were diagnosed before, 47.5% (\(n = 38\)) had the right side affected, and 15.0% (\(n = 12\)) had both sides affected (Table 3).

In terms of body mass index (BMI), 16.4% (\(n = 109\)) had a normal BMI range (18.5-24.9), and 9.3% (\(n = 62\)) were obese (more than 35). The majority exercised by walking...
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(46.3%, n = 308), resistance training, and specific sports football and boxing. In terms of comorbidities of the participants, 9.3% (n = 62) had obesity, 8.3% (n = 55) had diabetes, 5.1% (n = 34) had hypertension, and other comorbidities affected 9.5% (n = 63). The majority (49.3%, n = 328) wore sneakers frequently (Table 4).
Factors such as working jobs requiring 3-6 hours of standing or walking \( (p < 0.001, \text{odds ratio} = 1.81) \), age ranges 40-55 years \( (p < 0.001, \text{odds ratio} = 3.18) \), age ranges 56-65 years \( (p = 0.032, \text{odds ratio} = 3.44) \), obesity \( (p = 0.022, \text{odds ratio} = 2.17) \), and working jobs requiring 6-12 hours of standing or walking \( (p = 0.03, \text{odds ratio} = 1.85) \) were all associated with a higher rate of planter fasciitis. A lower incidence of PF was linked to male gender \( (p < 0.003, \text{odds ratio} = 0.54) \) (Table 5).

**Discussion**

Given that PF impairs a patient’s comfort and quality of life, it is crucial to look into its prevalence and risk factors. Studying the risk variables is essential because they have an impact on how well appropriate therapies work to lower the prevalence and incidence of PF [8]. This study sought to identify the pervasiveness of PF and risk factors linked to the ailment in the general population in the Al Jouf region of Saudi Arabia. The sample for the current study primarily consisted of adults aged less than 40 years, with a predominance of females, majority of them were singles, with university education and employed. It was discovered that 237 (35.6%) of the participants were employed in the teaching profession, followed by 95 (14.3%) in healthcare with the remaining individuals doing other jobs. 237 (35.6%), indicated that their work required them to be standing or walking for 3-6 hours each day, while 250 (37.6%) reported that their work required them to sit for fewer than 3 hours each day. PF was linked to long workdays spent standing or walking, according to a study by Messing and Kilbom [9] that produced similar results.

It was discovered that 12\% \( (n = 80) \) of the participants had PF. This prevalence was discovered to be higher than the 9.6\% prevalence established in the study by Thomas et al. [1]. The difference in prevalence might be explained by variables including work hours, physical activity, and other factors [1].

Of the majority of individuals diagnosed with PF, 38 (47.5\%) had the condition on their right side, 30 (37.5\%) on their left, and 12 (15.0\%) on both. Walking was the most often reported activity, with 46.3\% \( (n = 308) \) of the participants reporting it, 14\% \( (n = 93) \) reporting resistance training, and 13.7\% \( (n = 91) \) mentioning football and boxing. The findings mirror those of Taunton et al. [10] who reported exercise and running to be the risk factors for developing PF.

About 9.3\% \( (n = 62) \) of the participants were obese, 8.3\% \( (n = 55) \) participants had diabetes, 5.1\% \( (n = 34) \)
had hypertension, 3.8% \( n = 25 \) had cardiovascular disease, while 3.3% \( n = 22 \) used tobacco products or had health issues connected to tobacco use. Comparable results were seen in a study by Moroney et al. \[11\], wherein approximately 7% of the individuals with PF had comorbidities.

Based on the univariate analysis results, a higher incidence of PF was predicted by being 40-65 years old, obese, and working jobs that required 3-6 hours of standing or walking, as well as employment that required 6-12 hours of standing or walking. Regarding age, the results are consistent with a study by Dunn et al. \[12\] that discovered middle-aged participants had a higher frequency of PF. PF was projected to occur less frequently in males.

The utilization of a cross-sectional study design, which can only identify relationships between components but not causalities, was a major restriction and limitation of this work. Second, this study was hampered by the absence of a clinical evaluation and the individuals’ inconsistent responses. Furthermore, because the study was limited to a single region, its conclusions cannot be applied to the whole population of Saudi Arabia.

**Conclusion**

The study established a 12% prevalence rate of PF among the population of the Al Jouf region in Saudi Arabia. Comorbidities such as obesity, diabetes, hypertension, and cardiovascular illnesses were risk factors for the development of PF. Moreover, middle age and extended standing or walking work hours were linked to a higher chance of PF. PF was found to be more common in people who were 40-55 years old, 56-65 years old, obese, and employed in jobs that required 3-6 hours of standing or walking or 6-12 hours of walking. Conversely, the male gender was linked to reduced incidences of PF. It is imperative to provide education on PF risk factors and management to the Saudi Arabian populace to improve their overall quality of life.

**Conflicts of interest**

The authors declare that there is no conflict of interest regarding the publication of this article.

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None.

**Consent to participate**

Informed consent was obtained from all the participants.

**Ethical approval**

The approval and assessment were taken from King Faisal University’s Research Ethics Committee (REC) via Reference number ETHICS1319, dated: October 18, 2023.

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