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Prevalence and Associated Risk Factors of Foot Pain among Working Females - A Cross-Sectional Study

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Abstract

Background: Although foot pain in working women is an ongoing problem and may be related to footwear, the prevalence of foot pain in young females is still scarce. Therefore, this study aimed to discover the common cause of foot pain and its possible associated factors (body mass index and shoe heel height) in young working women in an urban setting in Karachi, Pakistan.

Methods: The survey was conducted on a group of working women aged between 21 and 40 who were selected using non-probability convenience sampling. Data on foot problems was collected through an investigator-directed questionnaire using adapted foot questionnaires. The data was analyzed using SPSS version 20.

Results: A total no. of 382 women between the ages of 21 and 40 who worked in various Karachi, Pakistan organizations were included in the study. The study revealed that the majority of these women (n=255) experienced moderate pain, most had average body mass indices (N=192), and most had previously worn shoes with heels higher than one inch (n=199). The prevalence of mild foot pain was 17.53%, moderate foot pain 66.75% and severe foot pain 15.7%.

Conclusion: Non-traumatic foot pain is joint among young working women, likely due to high-heeled shoes, prolonged working hours, and the standing nature of jobs.

Keywords

Body Mass Index, Foot Injuries, Pain, Women.

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Introduction

Foot pain is an independent risk factor for a locomotor disability that causes impaired balance, increased risk of falls, and loss of independence. It ultimately affects the Quality of Life (QoL)[1]. Due to fashion constraints and contemporary lives, women are likelier to choose high-heeled shoes than any other footwear. On the one hand, wearing heels increases appeal[2]. The long-term use of high heels can cause severe harm to the lower limb and many other problems[3]. One of the lower limb problems is non-traumatic foot pain, described as foot pain that occurs a minimum of once a month and non-traumatic foot pain occurs without any trauma. It has been reported that around 1 in 3 individuals over sixty-five years have foot pain[4]. Foot problems are common in older age people[5]. Approximately equal numbers of both males and females are affected by foot[6]. Females were found more likely to report pain within the toes and the ball of the foot than males[7]. Foot pain has been attributed to footwear with an elevated heel and narrow toe box associated with corns, lesser toe deformities and considerable toe deformity[8].

Furthermore, obesity and increased Body Mass Index (BMI) contribute to foot pain[9]. Some of the joint non-traumatic foot pain is metatarsalgia and plantar fasciitis[10]. Also, poor gait mechanics stress lower limb joints, which might lead to pathologies in ankle and foot joints[11]. Previous studies reported that girls have a higher incidence of foot conditions, particularly hallux valgus, corns and calluses, and these conditions are one of the causes of foot pain[12]. Moreover, a previous study indicates an association between BMI and foot pain in older people[13]. Some medical conditions like diabetes and rheumatoid arthritis are related to foot problems[14]. There are also psychological elements that contribute to foot pain[15]. Hence, the present study aims to determine the prevalence of foot pain among working females and its association with BMI.

Methodology

Study Design and Setting

The study was a descriptive cross-sectional study. Data was collected from shopping centres and offices in Karachi, Pakistan, using a non-probability convenience sampling technique. Permission was taken from the Ethical Review Committee of Isra University, Karachi, Pakistan. The confidentiality of participants was maintained. Informed consent was given.

Sample Size

The Rao soft sample-size calculator calculated a total of n=382 sample size.

Sample Selection Criteria

Working women aged between 21 and 40 also do jobs (university faculty or administrative work) in an office environment and are skilled or unskilled manual labourers, housemaids, or others. Moreover, women qualified with primary, secondary or tertiary levels of education. Women who have been experiencing non-traumatic foot pain for the past month have a history of any trauma

to the lower limb, such as fracture and chronic medical conditions, e.g. inflammatory arthritis and diabetes mellitus and past medical history of surgery of foot or ankle and performing standing or both sitting and standing nature of job were included in the study.

Data Collection Procedure

The investigator approached the participants, following which detailed study data was provided. For those participants who agree to participate, a written informed consent was signed by eligible participants. Moreover, data was collected through face-to-face interviews and validated with a modified questionnaire.

A validated and modified questionnaire was adapted from Chua et al. study in 2013[4]. Weight was measured using a weighing scale, and height was measured using a height-measuring scale to calculate body mass index (BMI) Figure 1. The BMI is divided into four groups: underweight (<18.5 kg/m^2), average weight (18.5–22.9 kg/m^2), overweight (23–24.9 kg/m2), and obese (≥25 kg/m2).

Data Analysis Strategies

- Statistical analysis was performed using SPSS version 20.
- Descriptive statistics regarding frequencies and percentages were run for demographics and adapted foot questionnaire.
- A chi-square test was run between shoe heel height and pain, BMI, and pain.
- The prevalence of foot pain was calculated by:

$$\text{Prevalence} = \frac{\text{Number of cases}}{\text{Total number of cases}} \times 100$$

Results

The result showed that 43.5% (n=166) of participants were 21-25. 25.9% (n=99) of participants aged 26-30 years. 16.2% (n=62) of participants belong to the age group 31-35 years, and 14.4% (n=55) of participants belonged to the age group 36-40 years; qualification, occupation and nature of the job are shown in Table-1.

Table-1 Demographics of participants	
Variables	**n (%)**
Age	
21-25	166 (43.5%)
26-30	99 (25.9%)
31-35	62 (16.2%)
36-40	55 (14.4%)
Participants Qualification	
Primary	12 (3.1%)
Secondary	103 (27%)
Tertiary	267 (69.9%)
Occupation	
University teaching faculty	197 (51.6%)
Managerial	69 (18.1%)
Factory labor	10 (2.6%)
House maid	13 (3.4%)
Others	93 (24.3%)
Nature of Job	
Standing	248 (64.9%)
Both sitting and standing	134 (35%)

A foot questionnaire was used to assess work quality, nature and frequency. The results showed that 64.9% of the females were doing standing jobs, with 77.5% wearing heel heights of more than 1 inch and 50.5% reporting working more than 7 hours a day. A detailed description is presented in Table-2.

Table-2 Participant responses on Foot Questionnaire	
Variables	**n (%)**
Do you work?	
Yes	382 (100%)
No	0 (0%)
Nature of job	
Standing	248 (64.95)
Both standing and sitting	134 (35%)
Foot pain from the past one month	
Yes	382 (100%)
No	0 (0%)
Undergone any lower limb (foot/ankle) surgery	
Yes	0 (0%)
No	382 (100%)
Undergone any lower limb (foot/ankle) trauma	
Yes	0 (0%)
No	382 (100%)
Congenital foot deformity (such as claw foot, club foot, flat foot, foot drop)	
Yes	0
No	382
Chronic medical condition (such as arthritis, COPD, diabetes, hepatitis)	
Yes	0 (0%)
No	382 (100%)
Shoe heel height	
Lesser than or equal to 1 inch	86 (22.5%)
Greater than 1 inch	296 (77.5%)
Duration of footwear worn to work each day	

Three hours (Leisure activities)	14 (3.7%)
Seven hours	175 (45.8%)
Greater than seven hours (work)	193 (50.5%)
Comfort level of foot wear	
Foot pain associated with foot wear	106 (27.7%)
Foot pain is not associated with foot wear	139 (36.4%)
Unsure of its cause	137 (35.9%)

The frequency of pain was measured using the same questionnaire; more than half, 66.8% of the participants reported moderate pain, with the majority reporting pain at the heel site (35.9%). Despite most participants wearing more than 1 inch heels, 69.4% believe the footwear does not cause foot pain. The detailed description is depicted in Table-3.

Table-3 Pain characteristics of participants

Variables	n (%)
Pain	
Mild	67 (17.5%)
Moderate	255 (66.8%)
Severe	60 (15.7%)
Site of Pain	
Heel	137 (35.9%)
Medial arch	70 (18.3%)
Lateral arch	40 (10.5%)
Ball of foot	48 (12.6%)
Toes	35 (9.2%)
Others	52 (13.6%)
Frequency of pain per week	

Less than 1 day per week	76 (19.9%)
1-2 days per week	151 (39.5%)
3-5 days per week	97 (25.4%)
More than 5 days per week	58 (15.2%)
Foot pain caused by foot wear	
Yes	117 (30.6%)
No	265 (69.4%)
Seek any medical care for foot pain	
Yes	99 (25.9%)
No	283 (74.1%)
Type of treatment	
Pain relieving medicine (oral/topical)	77 (20.2%)
Physiotherapy	22 (5.8%)

Table-4 is categorized according to the cross-tabulation between pain and shoe heel height, 199 of the women affected with moderate pain who had worn heels greater than one inch, 50 women had mild pain, and 47 women had severe pain due to heel height of their shoe more than one inch. Fifty-six women had experienced moderate pain, 17 women had mild pain, and 13 women had pain due to shoe heel height less than or equal to one inch.

Table-4 Cross-tabulation between BMI and Pain; Shoe heel height and Pain

BMI of Participants	Pain		
	Mild	Moderate	Severe
<18.5 Underweight	12	30	8
18.5-22.9 Normal	19	102	24
23-24.99 Overweight	8	31	6
25-29.9 Pre Obese	19	63	12
>30 Obese	9	29	10

Shoe heel height	Pain		
	Mild	Moderate	Severe
Less than or equal to 1 inch	17	56	13
Greater than 1 inch	50	199	47

A total 382 number of women were included in this study who were working in different organizations, schools, clinics and hospitals of Karachi, between the age group of 21 to 40 years; the result of this study has found that the majority of working women had moderate pain (n=255), and a majority of women had normal body mass index (n=145). They used to wear shoes with a heel height over one inch (n=296). The prevalence of mild foot pain was 17.53%, moderate foot pain 66.75% and severe foot pain 15.7%.

Discussion

In this study, 382 working women between the age group of 21 and 40 years from different organizations participated. Women who suffered from any lower limb (ankle or foot) trauma or surgery, any congenital deformity and any chronic medical condition were not included for the authenticity of this study. Several studies have been done on this topic before, and this study will add more information about foot conditions among working women in our society. Foot pain is widespread nowadays in our society, and the leading factors are shoe heel height and an individual's weight. A study conducted in 2020 by Zeidan concluded that wearing high-heeled shoes leads to increased pressure on the metatarsal head and causes pressure on various tissues of the foot[16]. Similarly, the result of this study also shows that wearing high heels caused foot pain among working females and the majority of women in this study pointed to heels as the most common site of pain. An alternate study conducted in 2020 found that most women complained of foot pain, which is also associated with high-heeled shoes[17].

A study conducted in 2019 concluded that foot problems are primarily associated with obese participants, and females are more affected than males. Also, the longitudinal arch and metatarsal head bear the most pressure in obese participants[1]. Contrasting results were found in our study, indicating that women with average body mass index are more affected by foot pain than overweight women. Another study concluded that older people usually wear poorly fitted shoes. Also, women reported about the use of high heels in their past and present that results in foot pain and foot pathologies[18]. This study also showed that foot pain is associated with heeled shoes. Another study concluded that females with older age and increased weight are more associated with foot pain[19].

Similarly, the current study showed that most females suffer from foot pain but belong to the normal group of BMI. A study conducted in 2020 concluded that there is no relation between age and BMI to foot pain, but high-heeled shoes during work time are a significant cause of foot

pain[20]. Similarly, this study also showed that BMI is not associated with foot pain during work, yet wearing high heels is one of the significant causes of foot pain among working women. Another study concluded that increasing pain among high-heel users is correlated with higher BMI, higher shoe height, and more hours per week spent wearing high heels[21]. The present study, however, concluded that wearing high heels is one of the causes of foot pain. To the best of our insight, despite differences between Western and Asian nations concerning social, cultural, and ethnic pieces, as well as shoe-wearing propensities, there is a lack of accessible information on footwear and foot health for Asian populations. Additionally, future research is required to determine best practice models for overseeing foot pain and decide whether the arrangement of foot care administrations, for example, podiatry, is adequate to address this expanding demand.

Future Recommendations

To summarize, a significant number of working ladies in Karachi, Pakistan, are experiencing foot pain because of wearing high-heeled shoes that are more than 1 inch high. The after-effects of this study underscore the significance of purposeful endeavours' toward making ladies more aware of the unfriendly impacts of wearing incorrect shoes. Expanded awareness of proper footwear in ladies may alter choice examples for shoes worn, particularly those well used during work hours, diminishing the event of different foot issues related to high-heeled shoes. This study may help working women better understand the health of their feet.

This study recommended a need to provide essential guidance or knowledge to the population about the general footwear assessment by physiotherapists, podiatrists, magazines and TV ads. Working women should wear comfortable and properly fitted shoes. Women with prolonged standing hours should wear shoes with soft and comfortable soles and avoid prolonged standing because this will lead to increased pressure on the foot and ultimately result in pain. It is also recommended that they purchase shoes with proper support at the heel, arches and toes. Stretching and daily exercises should also be recommended to avoid a sedentary lifestyle and being overweight.

Conclusion

The study found that most working women with normal BMI suffer foot pain due to wearing high-heeled shoes during work hours. This common issue, especially in young women, is expected to increase as obesity rates increase. In Asian countries, wearing shoes at home is considered indelicate, and prolonged work hours and the standing nature of jobs contribute to foot problems.

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Conflict of Interest
None.

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None.

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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: Khan RA, Hussain F

Acquisition, Analysis or Interpretation of Data: Khan RA, Hussain F

Manuscript Writing & Approval: Khan RA, Hussain F

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.