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Research Article

Foot Health & Its Association with the Quality of Life in Individuals with Foot Dysfunctions

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Abstract

Foot health plays a critical role in maintaining overall health and functions. Foot fitness is dependent upon many factors. Various problems limit the foot's functionality and affect the quality of life. Posture, gait, mobility, and balance are directly related to podiatric health. The study aimed to determine foot health and quality of life in individuals with foot dysfunctions and establish its relationship with quality of life. A cross-sectional survey was conducted among the general population of the twin cities of Pakistan (Islamabad & Rawalpindi). A self-structured online questionnaire was distributed among 323 individuals aged 25-60 years suffering from different foot problems. The study showed that 259 (80.19%) of the participants were females, and 64 (19.81%) were males. Teachers, nurses, beauticians, and housewives reported moderate pain levels on numeric pain rating scales, likely associated with long standing hours and the use of flat and tight shoes. This impacted their ability to perform daily tasks, moderate to vigorous activities, and limited ability to walk. This study concluded that the most commonly reported issues were heel pain, ankle pain, and metatarsalgia. Moreover, the commonly affected foot regions were the hind foot and toes. Diet and social life remained mostly unaffected in individuals with heel pain and edema as these conditions were very common among the selected population, and they adapted their lifestyles accordingly. In conclusion, health and quality of life were negatively impacted in individuals with metatarsalgia, flat foot, and ankle sprain.

Keywords: Foot dysfunctions, foot health, foot pain, quality of life, shoe wear

1. Introduction

Foot dysfunction includes musculoskeletal, neurological, dermatological, or vascular disorders, each requiring its case description. They can occur in any foot region but especially in the toes and forefoot. Foot dysfunctions are fairly prevalent, but their effects on health and lifestyle have not been properly reported in the literature. This dysfunction may affect physically active people as well as individuals with a sedentary lifestyle.

A recent survey conducted by American Podiatric Medical Association (APMA) showed that 51% of the population faced difficulty performing routine tasks due to issues with foot health. Unfortunately, people remain unaware of the importance and role of a podiatrist in such cases (PODO). Frequent non-traumatic foot pain was reported in half of the young working women in a study carried out on an Asian population, and more than half of those (68.4%) considered footwear as a reason for pain (Chua et al. 2013). A comprehensive review of the literature performed by (Thomas et al. 2011) provides evidence that a significant number of people (twenty-four percent) aged above forty-five showed increased recurrence of pain in the

Table 1. Foot problems and frequency of pain.

Frequency	Foot Problems								
	Heel pain	Ankle pain	Ankle sprain	Nail problem	Metatar salgia	Flat feet	Pes Cavus	Edema	Others
Never	27.3%	18.2%	0.0%	27.3%	18.2%	0.0%	9.1%	9.1%	9.1%
Occasionally	58.9%	16.8%	6.3%	9.5%	6.3%	3.2%	3.2%	13.7%	1.1%
Fairly often	53.1%	20.4%	10.2%	6.1%	18.4%	10.2%	2.0%	18.4%	2.0%
Very often	61.0%	36.2%	9.5%	5.7%	27.6%	10.5%	1.0%	20.0%	1.9%
Always	69.8%	20.6%	3.2%	11.1%	34.9%	14.3%	0.0%	17.5%	6.3%

terminal portion of the lower limb in men as well as women. One in five females above 18 showed increased pain in a recent study done in Australia (Khan et al. 2019). Many patients suffer from foot dysfunctions but do not pay much attention to the treatment. Large-scale studies concerning the impact of such issues on life quality have not been conducted, although researchers have reported the relationship between these two variables in small population sizes of different types.

Foot dysfunction may cause pain, walking or climbing stairs limitations, and participation in daily activities (Rodríguez-Sanz et al. 2018). Furthermore, arthritic joints and diabetic foot are among the common causes of foot dysfunctions that greatly affect one's quality of life (Alrub et al. 2019). Pressure exerted by improper shoe wear can cause metatarsalgia, corns, and calluses. Some other foot dysfunctions include plantar fasciitis, bunions, bunionnette, Morton's neuroma, hammertoe, Ingrown toenails, onychocryptosis, claw, and mallet toe (Ray et al. 2017). A study conducted on runners showed that weak leg and hip muscles could alter the lower extremity biomechanics, which could also be one of the reasons for over-pronated feet and altered foot posture (McLean et al. 2014). Body mass index (BMI) is also helpful in identifying the health-related risk factors associated with body fat ratio. Higher BMI in both genders enhances the risks of podiatric disorders and pain. Individuals with higher body weight or those in the obese category are highly prone to foot pain, pes planus, and increased plantar Pressure while walking as compared to individuals of normal weight (Dufour et al. 2017). The objective of the present study was to assess the frequency of foot dysfunctions in the general population of the twin cities of Islamabad and Rawalpindi in Pakistan and investigate the potential association between overall foot health and quality of life.

2. Materials & Methods

A cross-sectional study was conducted in the cities of Islamabad and Rawalpindi. The data was collected through online questionnaire from the medical centers, hospitals, educational institutes, and offices to capture diversity in the population concerning their occupations. Epitool

Table 2. Foot problems and maximum hours of standing.

Maximum Standing Hours	Foot Problems								
	Heel pain	Ankle pain	Ankle sprain	Nail problem	Metata-rsalgia	Flat feet	Pes Cavus	Edema	Others
3-4 hours	54.0%	19.5%	6.9%	13.8%	13.8%	6.9%	1.1%	18.4%	2.3%
5-6 hours	53.8%	22.6%	7.5%	8.5%	21.7%	6.6%	3.8%	16.0%	0.0%
7-8 hours	70.7%	28.3%	4.3%	7.6%	22.8%	10.9%	1.1%	16.3%	3.3%
More than 8 hours	63.2%	31.6%	13.2%	0.0%	31.6%	13.2%	0.0%	18.4%	10.5%

Table 3. Effect of foot problems on different occupations.

Occupation	Foot Problems								
	Heel pain	Ankle pain	Ankle sprain	Nail problem	Metata-rsalgia	Flat feet	Pes Cavus	Edema	Others
Housewives	62.2%	22.7%	9.2%	8.4%	23.5%	6.7%	0.0%	27.7%	0.8%
Teachers	66.7%	26.7%	2.2%	6.7%	22.2%	4.4%	0.0%	20.0%	2.2%
Beauticians	75.0%	41.7%	0.0%	0.0%	33.3%	25.0%	0.0%	8.3%	25.0%
Businessman	31.8%	27.3%	9.1%	9.1%	27.3%	4.5%	9.1%	4.5%	0.0%
Student	51.2%	14.6%	7.3%	12.2%	7.3%	12.2%	4.9%	4.9%	0.0%
Golfer	60.0%	40.0%	0.0%	0.0%	80.0%	20.0%	0.0%	0.0%	0.0%
Nurses	76.5%	58.8%	11.8%	11.8%	11.8%	5.9%	0.0%	5.9%	11.8%

calculator was used to calculate the sample size which was 323 (n=323). The participants were eligible for this study if they met the following criteria: Age: between 25-60 years, genders: both, foot dysfunctions > 1 month. Participants with foot surgery, wounds, acute fracture, infections, or tumors were excluded from the study.

2.1 Foot Health Status Questionnaire

The foot health status questionnaire (FHSQ) was used to assess foot health which is considered a standard document for assessing conditions of the foot and included questions about foot function, foot health, foot pain, and footwear (Riskowski, Hagedorn, and Hannan 2011). It was divided into three sections. Part A of the questionnaire included demographics such as age, gender, occupation, education, and BMI (kg/m2) and simple questions regarding foot problems, foot problem region, and maximum standing hours. Part B was related to the foot health section, which included information about foot pain (foot pain and frequency of pain),

Table 4. Effect of different types of shoe wear on foot problems.

Shoe wear	Foot Problems								
	Heel pain	Ankle pain	Ankle sprain	Nail problem	Metata rsalgia	Flat feet	Pes Cavus	Edema	Others
Flat shoes	27.9%	11.1%	3.1%	2.8%	7.4%	3.4%	0.3%	9.0%	1.5%
Tight shoes	2.8%	0.9%	0.3%	1.5%	3.4%	0.6%	0.6%	0.6%	0.0%
Joggers sneakers	6.8	2.2%	0.9%	1.2%	2.8%	1.9%	0.0%	1.5%	0.6%
Heels (2-4 inches)	6.5	4.3%	1.2%	0.6%	2.5%	0.0%	0.3%	1.5%	0.3%
Casual shoes	11.8	4.0%	1.2%	1.2%	3.1%	2.5%	0.6%	2.8%	0.3%

Table 5. Foot problems and overall health.

Overall Health	Foot Problems								
	Heel pain	Ankle pain	Ankle sprain	Nail problem	Metata-rsalgia	Flat feet	Pes Cavus	Edema	Others
Very good	4.0%	0.0%	0.6%	0.0%	0.9%	0.0%	0.0%	0.3%	0.0%
Good	26.9%	13.6%	4.2%	4.6%	8.7%	4.0%	1.9%	6.8%	1.9%
Fair	22.3%	8.4%	2.2%	2.5%	7.1%	3.1%	0.0%	6.5%	1.5%
Poor	6.5%	2.5%	0.3%	1.5%	4.3%	1.5%	0.0%	3.4%	0.3%

foot health (difficulty in performing daily activities and foot condition), and footwear (type of shoe worn and difficulty in finding appropriate shoes for their feet). Part C consisted of the quality of life section, which included general health domain, vigor (vigorous and moderate activities, difficulty walking long distances), social capacity section (social life and feelings of tiredness), and questions about medications taken for other co-morbidities. The questionnaire can be filled in a very short time (10 minutes). The FSHQ is known for its reliability and validity. The Retest Intra-class Correlation Coefficient Reliability was (ICC = 0.74–0.92) with the validity of Cronbach between 0.89–0.95).

2.2. Numeric Pain Rating Scale (NPRS 11)

It is a one-dimensional scale for evaluating pain intensity across various patient types, according to the National Institutes of Health and IMMPACT. It comprises 11 points in which 0 represents no pain, and ten shows the worst possible pain. Pain rating scores were: 0 as no pain, 1-3 as mild pain (interfering slightly with activities of daily life (ADLs), 4-6 as moderate pain (interfering significantly with ADLs), and 7-10 as severe pain (inability to perform

Table 6. Vigorous activities and foot problems.

Vigorous Activities	Foot Problems								
	Heel pain	Ankle pain	Ankle sprain	Nail problem	Metatarsalgi	Flat feet	Pes Cavus	Edema	Others
Yes, limited a lot	18.6%	7.7%	1.2%	3.4%	8.7%	3.4%	0.3%	7.7%	1.5%
Yes, limited a little	32.2%	13.9%	4.0%	3.4%	9.9%	4.3%	1.2%	7.4%	0.9%
No not limited at all	9.0%	2.8%	1.9%	1.9%	2.5%	0.9%	1.3%	1.9%	0.3%

Table 7. Foot problems and the ability to perform daily activities and routine work.

Difficulties in work or activities	Foot Problems								
	Heel pain	Ankle pain	Ankle sprain	Nail problem	Metata-rsalgia	Flat feet	Pes Cavus	Edema	Others
Not at all	4.6%	1.5%	0.3%	0.6%	0.9%	0.0%	0.6%	0.6%	0.3%
Slightly	16.7%	5.0%	2.2%	1.9%	3.7%	3.1%	0.9%	2.5%	0.0%
Moderately	19.2%	10.2%	1.5%	3.7%	7.1%	2.2%	0.3%	5.0%	0.9%
Quite a bit	6.8%	2.5%	0.6%	0.6%	1.9%	1.2%	0.0%	4.3%	0.0%
Extremely	12.4%	5.3%	2.5%	1.9%	7.4%	2.2%	0.0	4.6%	1.5%

ADLs). High test–retest reliability in educated patients was 0.96, while in uneducated patients, it was 0.95.

2.3. Data Analysis

Data were analyzed through the statistical package of social sciences (SPSS-22). Descriptive statistics are used to find percentages and frequencies for qualitative data. A chi-square test was applied to find the association between foot dysfunctions and quality of life. Tables and Pie charts were also plotted using IBM SPSS-22.

3. Results

A total of 323 participants (Mean age 37.4 ± SD 10.4) were part of this study. The participants included both males and females. There were 259 (80.19 %) females and 64 (19.81 %) males (Figure 1). The representation of the participants as per age group is shown in Figure

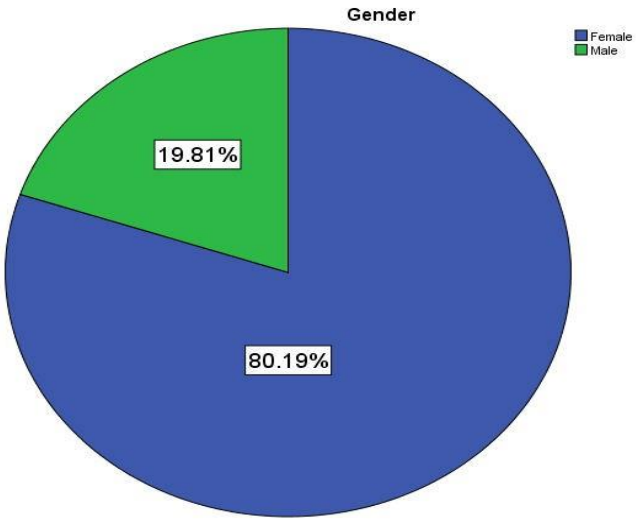

Figure 1. Gender distributions of the participants.

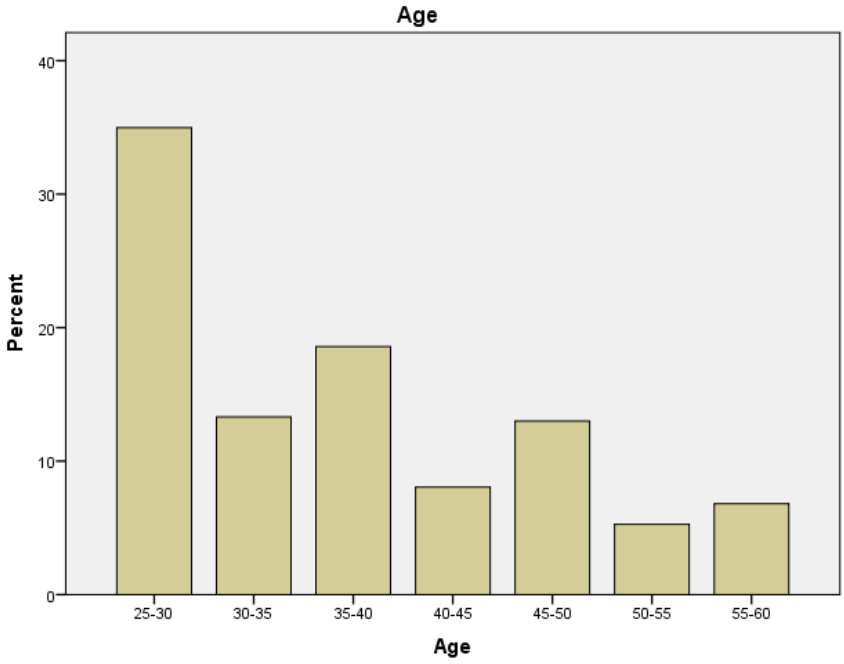

Figure 2. Age distributions of the participants.

2. The BMI of each participant was measured using height and weight according to the WHO BMI classification, shown in Figure 3. The profession or occupation of the participants was also recorded. The relationship between occupation and foot problems was also analyzed. The professionals that stand for long hours, such as teachers, nurses, doctors, and site engineers, have greater chances of developing foot problems and pain. The data of golf players, beauticians, teachers, and dentists were also noted and analyzed. The pattern of the foot problem and the types of problems that these professionals face give useful insight into the effect of the profession on foot health (Figure 4).

Table 1 shows the association of foot problems with the frequency of pain. Participants were asked how often they had foot pain during the last week due to their foot problems. 34.9% of individuals with metatarsalgia reported always suffering from pain, while 36.2% of subjects reported that they very often feel pain due to problems in the ankle joint. People who complained of heel pain always (69.8%) suffered from pain.

It is possible that the people who stand a lot during the whole day may suffer from any of the foot problems that are mentioned in this study. A continuous even or uneven plantar pressure on the foot may result in the development of many foot problems. Ignoring foot problems is common in our society. Daily activities with prolonged standing hours can cause a worsening of the problem. The results in Table 2 show that more patients with heel pain were reported, and most (70.7%) of those with heel pain stand for 7 to 8 hours, while 63.2% of those with heel pain stand for more than 8 hours. People with metatarsalgia and nail problems (onychocryptosis) stand for more than 8 hours (31.6%) and 3-4 hours (13.8%), respectively.

Due to prolong standing hours in different occupations, foot problems can occur frequently. Prolonged standing can also cause edema as blood flow toward the heart slows down. Table 3 shows the frequency of foot problems in different occupations. Participants from different professions were asked about their foot problems. Most Nurses (76.5%), teachers (66.7%), housewives (62.2%), and beauticians (75.0%) reported heel pain. While 58.8% of nurses, 41.7% of beauticians, and (40.0%) of golfers reported mainly ankle pain. 27.7% of housewives and 20% of teachers had edema on their feet, affecting their quality of life.

Shoes are an important factor that can contribute to many foot problems. Table 4 shows foot problems and shoe wear. Participants were asked about the type of shoes they usually wear, and most of the participants with heel pain wore flat shoes (27.9%), individuals with metatarsalgia reported use of flat shoes (7.4%) and tight shoes (3.4%), participants with nail problems reported the use of joggers and sneakers 1.2 %.

The association of foot problems with the quality of life aspects such as overall health and limitation in performing vigorous activities are displayed in Table 5. Foot problems might have an impact on overall health. Participants with different foot problems were asked about their overall health. Out of them, 6.5% of individuals with heel pain and 4.3% with metatarsalgia reported poor overall health, while 8.4% of individuals with ankle pain reported fair overall health.

Vigorous activities require great strength and power for lifting heavy objects, swimming, or jumping. To be able to perform a vigorous activity is an indicator of good overall health and foot health specifically. Foot problems can limit this ability. Table 6 shows the frequencies of foot problems and vigorous activities. Participants with foot problems were asked about their ability to perform vigorous activities, and 18.6% of individuals with heel pain reported that they felt limited in performing vigorous activities, 32.2% with heel pain were limited a little, and 9.0% were not limited at all. Individuals with metatarsalgia (8.7%) reported that they were limited a lot in performing vigorous activities, while 9.9% of individuals reported that they were limited a little. Individuals with ankle pain (13.9%) reported little limitation, while 7.7% of individuals with ankle pain and edema were very limited in performing such activities.

Foot problems can cause many difficulties for individuals, including the ability to perform normal work activities. Participants were asked about the difficulties faced due to foot

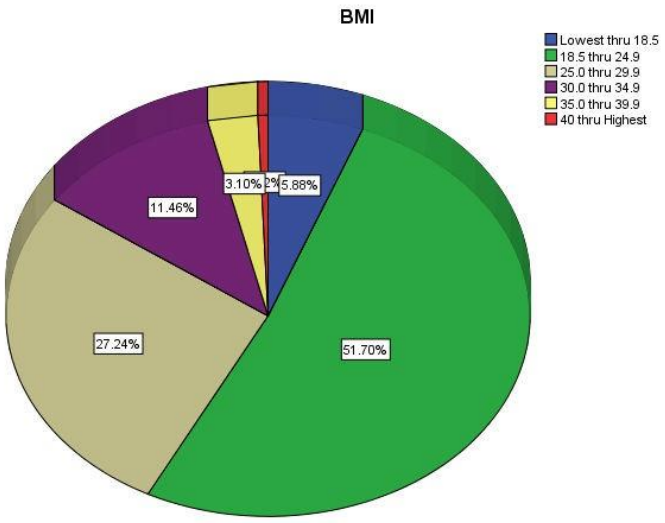

Figure 3. Frequency distribution of BMI.

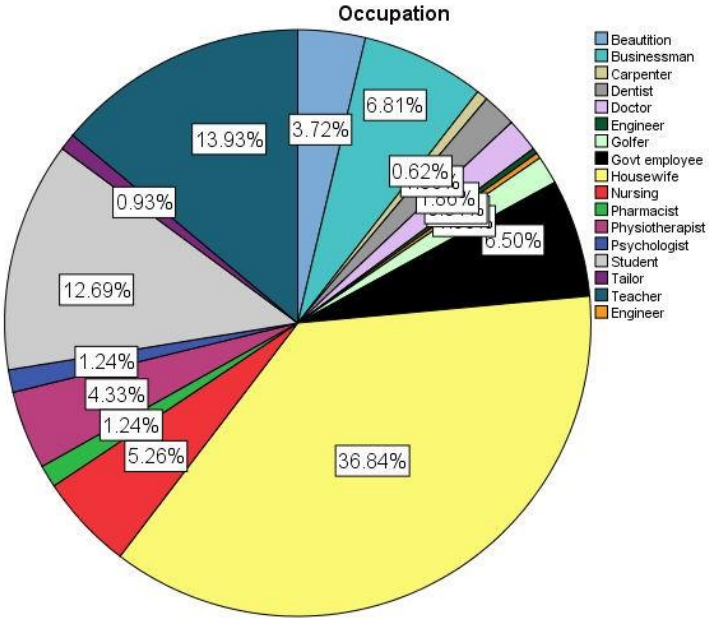

Figure 4. Percentage distribution of occupation.

problems that impacted their activities of daily living, quality of life, and foot health. Participants (19.2%) mentioned that their daily activities were moderately affected due to heel pain. Individuals with metatarsalgia (3.7%) reported difficulty in performing daily activities (table 7).

4. Discussion

In the current study, the most commonly reported foot problems were heel pain, ankle pain, and metatarsalgia, and the commonly affected foot regions were the hind foot and toes. Teachers, nurses, beauticians, and housewives had prolonged standing hours with moderate levels of pain on the NPRS scale. Our study also showed the association between

their foot problems with standing hours and the use of flat and tight shoes, which also had an impact on their ability to perform daily. Heel and ankle pain were commonly observed in nurses and teachers, which can be associated with the type of shoe worn (heels) and prolonged standing hours in these professions. Quality of life, such as social life and general health, was not much affected in individuals with heel pain and edema as these conditions were very common in the selected population of the study, and individuals tended to adapt to their lifestyle. However, foot health and quality of life are negatively affected in individuals with metatarsalgia, flat feet, and ankle sprain.

It is known that the prevalence of foot disorders is higher in females (López-López et al. 2018). The current study also shows that foot problems are more common in females, and the most affected population was housewives (36.84%). The same study indicates that foot problems negatively affect the quality of life, which is also similar to the results of the present study. Some of the problems Lopez et al. found include hallux valgus (29.9%), flat foot (11.4%), metatarsalgia (5.7%), and heel pain (5.3%) that affect the foot function and health of the foot. They also found that 30.6% of the population with heel pain had severe limitations in walking and performing daily activities. Similarly, despite the difference in the population size, the present study found that there was a higher prevalence of heel pain (59.2%), ankle pain (24.2%), and metatarsalgia (20.9%) while flat foot (8.6%), and pes Cavus (1.8%) were less common.

A Study performed in 2018 used an online questionnaire in which there were 67.3 % females and 32.4 % males (Hendry et al. 2018). They related the variables such as BMI, age, occupation, and economic conditions with the presence of moderate to severe foot pain. They found that moderate pain to severe pain mostly occurred in the educated population; the percentage of the affected population was 40%. That study also related the pain levels as per the NPRS scale with education. It was observed that a considerable proportion, 98 (30.1%) of the graduated population suffered from moderate pain (46%) and severe pain (14.3%). The 75 (23.0%) post-graduate students suffered from moderate pain (49.3%) and severe pain (21.3%). Hence, the proportion of the graduated population suffering from moderate pain (46.6%) was higher (46). Moreover, they also studied the presence of other medical conditions along with foot problems in the individuals. The most commonly found medical comorbidities were back pain (26.3%), the second most reported one was knee pain (23.1%), depression (11.2 %), and hypertension was reported as (9.8%) (Hendry et al. 2019).

The type of shoe wear or footwear choices also harms foot functions and may cause pain. A study was conducted by (Khan et al. 2019) involving physical therapy students of Karachi to find the association between footwear and foot pain. They observed that 30.9% of their female participants chose to wear pumps and pointed box shoes, while flat shoes (43.9%) were the most common footwear choice in the current study. In the aforementioned study, there was no association between foot pain and footwear, while in the current study; individuals who wore flat shoes (43.9%) suffered from moderate pain (49.0%). Those wearing casual shoes (17.8%) also had moderate pain (43.1%), but no association between footwear and foot pain was found.

The limitations of the current study are many. First, the diagnosis of the foot problem was not made by any physician. No physical examination was possible due to the inability to access hospitals due to COVID-19. It must be mentioned that as the overall awareness about health in Pakistan is low, and people do not know much about the medical terminologies

of diseases and disorders, the questionnaire form was kept simple for the ease of the participants.

5. Conclusions

Healthcare professionals could use our findings on foot health and quality of life to plan patient treatment protocols. It is important to note that limited evidence in this area is available in Pakistan. A greater understanding of the impact of foot dysfunctions on quality of life would improve clinical practice and decision-making for rehabilitating patients with foot dysfunctions.

Conflict of interest

The authors declare that they have no conflicts of interest to disclose.

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Study Approval

The review board of the Riphah International University, Islamabad, approved this study.

Consent Forms

Each participant signed a consent form. These forms are available with the authors.

Authors Contributions

MK conceptualized the study and wrote the initial manuscript, JZ helped with the literature search analysis and writing the first draft, KM, TS and MS did the data collection and review of the studies, and MK supervised the whole project and wrote the final manuscript.

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