

The prevalence of foot pain and its associated factors among Saudi school teachers in Abha sector, Saudi Arabia

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ABSTRACT

Background: The heel is the prominence at the posterior end of the foot. It is based on the projection of one bone, the calcaneus or heel bone, behind the articulation of the bones of the lower leg. Foot pain is not rare finding in the general population, particularly in older adults. The prevalence in adults ages ≥ 18 year's ranges from 17 to 24%. Heel pain is a general term used to describe pain and discomfort felt anywhere in or around the rear of the foot. This study aimed to estimate the prevalence of heel and foot pain and their determinants among teachers in Abha sector. **Methodology:** A deceptive cross-sectional approach was applied for the current research. All accessible teachers working in governmental and private schools in Abha sector. To be included, teachers should be teaching but not in administrative positions, free of musculoskeletal disorders due to causes other than teaching. Teachers with foot congenital anomalies, newly employed teachers. A self-administered questionnaire was personally distributed to included school teachers in Abha sector. Questionnaires were distributed and collected on second day after being filled by teachers. Posterior HP health Survey questionnaire was used to assess foot and foot pain. **Results:** The study included 1,439 teachers from different districts of Abha sector with their ages ranged from 24 to 60 years old with mean age of 41 ± 9 years. Female teachers constituted 72.8% of the sample and teachers' weight ranged from 45 to 185 kg with mean weight of 76.6 ± 18.2 kg. Exact of 85.5% of the teachers had foot pain during the last 12 months. Foot pain was mild among 17.3% of the teachers with foot pain and severe among 25.5% of them. Low back pain was recorded among 81% of the teachers followed with knee pain (62%), neck pain (58%), shoulder pain (55%), and wrist pain (28%). **Conclusions and Recommendations:** In conclusion, the study revealed that majority of teachers complained of foot pain. The pain was moderate especially after long standing. The pain was more among old aged teachers with high load of teaching sessions. The pain altered the traditional daily activities among majority of teachers but very few number who asked for medical consultation.

Keywords: Body ache, foot pain, heel pain, musculoskeletal disorders, predictors, teachers, teaching load

Background

The heel is the prominence at the posterior end of the foot. It is based on the projection of one bone, the calcaneus or heel bone, behind the articulation of the bones of the lower leg. The

compressive forces applied to the foot are distributed along five rays, three medial (side of big toe) and two lateral (side of little toe). The lateral rays stretch over the cuboid bone to the heel bone and the medial rays over the three cuneiform bones and the navicular bone to the ankle bone. The heel thus forms the posterior point of support that together with the balls of the large and little toes bear the brunt of the loads.^[1,2]

Foot pain is not rare finding in the general population, particularly in older adults. The prevalence in adults ages ≥ 18 year's ranges

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from 17 to 24%.^[3,4] Heel pain is a general term used to describe pain and discomfort felt anywhere in or around the rear of the foot.^[5] It was recorded among those who stand for long time or runners as it was recorded among 10% of them and also the same rate among general population.^[6] There were other less common conditions associated with heel pain such as osteomyelitis, bony abnormalities such as calcaneal stress fracture or tumor. Heel pain is not common symptom for systemic diseases, but the latter may be a factor in persons with bilateral heel pain, pain in other joints, or known inflammatory arthritis conditions.^[7]

Foot pain including heel pain is associated with decreased ability to perform daily activities smoothly, problems of imbalance and walking pattern, and increased risks of falls.^[8-10] The incidence of foot pain reported to be high having impact on the quality of both work and daily life.^[11] Work related and psychosocial factors have been found associated with pain in various anatomical sites among healthcare workers.^[12]

Heel pain is the most common in active people old adults. The high prevalence may be due to decreased elasticity of the plantar fascia and a delayed the healing process with age. Also it is common among active children and adolescents between the ages of 8 and 13. Heel pain occurs in both heels (bilaterally) in less than 30% of cases but mainly the left side is more affected. The opposite heel may follow with similar symptoms, often as a result of compensation.^[13-15]

Teaching is one of the jobs that need high physical activity, long standing and effort. Several factors have been implicated with the high prevalence of musculoskeletal pain among school teachers. These included lifting of heavy load, prolonged sitting, improper posture, anxiety level, high job demand/workload, low peer/colleague support.^[16,17]

Significance of the Study

Most studies in Saudi Arabia or even other countries concerned with shoulder pain, back pain, neck pain, and other musculoskeletal disorders among teachers and medical staff neglecting foot pain and plantar fasciitis.^[16-21] the aims of this study were therefore to estimate the prevalence of heel and foot pain their determinants among teachers in Abha sector.

Methodology

A deceptive cross-sectional approach was applied for the current research after taking the approval from ethical committee 15-05-2019. The research targeted all accessible teachers working in governmental and private schools in Abha sector. To be included, teachers should be working in teaching but not in administrative positions, free of musculoskeletal disorders due causes other than teaching. Teachers with foot congenital anomalies, newly employed teachers (Less than 6 months), teachers refused to participate in the study were excluded. A total sample of 270 teachers were required to estimate expected heel pain rate among

teachers of 10%^[14] using precision of 5% at 95% confidence level. A Stratified multistage cluster sampling technique was used for sampling teachers. Stratification made at two levels. At first level, school were stratified into private and governmental. At second level, schools within each first level strata were divided into primary, intermediate and secondary stages. At first stage clustering, one school within each strata level was selected (school with the largest teachers' number). At second stage clustering, all teachers were invited to participate in the study after explaining the aim and significance of the research.

After obtaining permission from Institutional ethics committee, a self-administered questionnaire was personally distributed to included school teachers in Abha sector. Questionnaires were distributed and collected on second day after being filled by teachers. The questionnaire covered participants' demographic information such as age, marital status, number of children, monthly income, education degree, years of work), low back pain data, work-related data including use of number of work sessions weekly, work conditions like long standing, co-existing medical diseases, lifestyle and habitual physical activity level (exercises and extracurricular activities, smoking), and effect of pain on daily activities and medical consultation for pain. Posterior HP health Survey questionnaire was used to assess foot and foot pain. The filter question "In the past month, have you had any ache or pain that has lasted for one day or longer in your feet?" Respondents reporting foot ache or pain in the past month were asked to shade the location of their foot ache/pain on a foot manikin showing the dorsal, plantar, and posterior aspects of both feet.^[22] Also degree of pain was assessed using 0–10 likert scale with score ranged from 0 to 3 was considered as mild pain, 4–7 (moderate) and 8–10 (severe).

Data analysis

After data were collected it was revised, coded, and fed to statistical software IBM SPSS version 22. The given graphs were constructed using Microsoft excel software. All statistical analysis was done using two tailed tests and alpha error of 0.05. *P* value less than 0.05 was considered to be statistically significant. Frequency and percent were used to describe the frequency distribution of each category for teachers' data while mean with standard deviation described numerical data. Chi-square/Mont Carlo exact test and Fisher's exact test were used to test for the differences between teachers' bio-demographic data and foot pain. To identify the most significant determinants of foot pain, multiple stepwise logistic regression model was used.

Results

The study included 1,439 teachers from different districts of Abha sector with their ages ranged from 24 to 60 years old with mean age of 41 ± 9 years. Female teachers constituted 72.8% of the sample and teachers' weight ranged from 45 to 185 kg with mean weight of 76.6 ± 18.2 kg. About 98% of the teachers worked in governmental schools and 56% of them teach for primary grades. Exact of 63.1% of the sampled teachers had

16 weekly teaching session or more and 70% worked for more than 10 years. About 84% of the teachers were free of chronic health problem and 4.4% were diabetic and 3% were hypertensive while 4% complained of arthralgia. Exact of 45.6% of the teachers practice sports regularly especially walking and 40% not practice sport at all [Table 1].

Figure 1 demonstrates the prevalence of foot pain among sampled teachers which indicated that 85.5% of the teachers had foot pain during the last 12 months. Foot pain was mild among 17.3% of the teachers with foot pain and severe among 25.5% of them. About 39% of the teachers experienced foot pain with long standing and 35.2% of had the pain nearly all the time. As for most affected foot areas with the pain, 66.6% of the teachers selected area 1 and 40.2% recorded area 4 [Table 2, Figure 2].

On relating foot pain with teacher biodemographic data and life style [Table 3], it was clear that 85.1% of teachers aged above 45 years had foot pain compared to 77.1% of those who aged less than 35 years with statistical significance ($P = 0.004$). As for weight, 92% of the teachers weighted more than 100 kg had foot pain compared to 85.5% of those whose weight was less than 60 kg with borderline significance ($P = 0.062$). Also 88% of teachers who had more than 16 sessions per week complained of foot pain compared to 81.4% of those who had fewer session ($P = .001$). As for work years, 86.8% of teachers who worked for more than 10 years complained of foot pain compared to 82.6% of others with less working years ($P = .035$). Also 89.1% of teachers who not practicing sports had foot pain compared to 81.7% of those who did ($P = .001$). Long standing was associated with foot pain among 86.7% of the teachers while 82.8% of those who wear traditional shoes recorded complaining of foot pain.

As for other body sites pain [Figure 3], low back pain was recorded among 81% of the teachers followed with knee pain (62%), neck pain (58%), shoulder pain (55%), and wrist pain (28%).

Regarding effect of foot pain on teachers' ordinary activity [Figure 4], ordinary life activities performance was

affected among 79.4% of teachers with foot pain and only 17.7% of them asked for medical consultation.

Finally, logistic regression model revealed that among all studied factors that affect pain, only number of weekly session, long standing were the most hazardous predictors while and practicing sports was the only significant protective predictor [Table 4].

Table 1: Bio-Demographic data of sampled teachers in Abhasector, Saudi Arabia

Bio-Demographic data		No	Percentage
Gender	Male	391	27.2%
	Female	1048	72.8%
Age in years	<35 years	164	11.4%
	35-44	846	58.8%
	45-60	429	29.8%
Weight in Kg	<60 kg	145	10.1%
	60-79	746	51.8%
	80-99	448	31.1%
	100+	100	6.9%
School type	Governmental	1413	98.2%
	Private	26	1.8%
	Primary	806	56.0%
Teaching grade	Intermediate	270	18.8%
	Secondary	363	25.2%
Weekly sessions	1-15	531	36.9%
	16+	908	63.1%
Years of work	1-10	430	29.9%
	11+	1009	70.1%
	No	1207	83.9%
Co-morbidities	DM	63	4.4%
	HTN	42	2.9%
	Arthralgia	57	4.0%
	Gout	12	.8%
	Disc prolapse	25	1.7%
	Others	33	2.3%
Practice sports regularly	No	576	40.0%
	Yes	656	45.6%
	Sometimes	207	14.4%

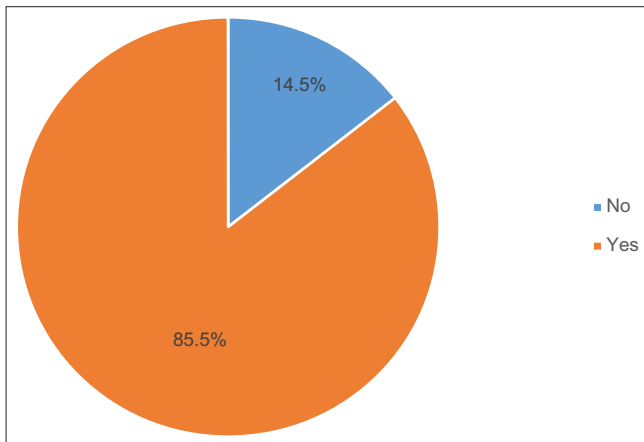


Figure 1: Foot pain prevalence among teachers in Abhasector, Saudi Arabia

Table 2: Foot pain data among teachers in Abhasector, Saudi Arabia

Foot pain data		No (1231)	Percentage
Degree of pain	Mild	213	17.3%
	Moderate	704	57.2%
	Severe	314	25.5%
Pain frequency	Early morning and after rest	317	25.8%
	With long standing and sports	481	39.1%
	Most of the time	433	35.2%
Affected area	Area 1	816	66.6%
	Area 2	322	26.3%
	Area 3	254	20.7%
	Area 4	493	40.2%
	Area 5	383	31.2%

Table 3: Distribution of foot pain by teachers' bio-demographic characteristics and behavior

Factors		Foot pain				P
		No		Yes		
		No	Percentage	No	Percentage	
Age in years	<35 years	37	22.6%	127	77.4%	.004*
	35-	107	12.6%	739	87.4%	
	45-60	64	14.9%	365	85.1%	
Weight in Kg	<60 kg	21	14.5%	124	85.5%	.063
	60-	117	15.7%	629	84.3%	
	80-	62	13.8%	386	86.2%	
	100+	8	8.0%	92	92.0%	
School type	Governmental	201	14.2%	1212	85.8%	.062
	Private	7	26.9%	19	73.1%	
Weekly sessions	1-15	99	18.6%	432	81.4%	.001*
	16+	109	12.0%	799	88.0%	
Years of work	1-10	75	17.4%	355	82.6%	.035*
	11+	133	13.2%	876	86.8%	
Practice sports regularly	No	63	10.9%	513	89.1%	.001*
	Yes	120	18.3%	536	81.7%	
	Sometimes	25	12.1%	182	87.9%	
Long standing	No	29	32.6%	60	67.4%	.001*
	Yes	179	13.3%	1171	86.7%	
Type of shoes you wear	Medical	42	10.9%	345	89.1%	.027*
	Sport	78	14.4%	463	85.6%	
	Others	88	17.2%	423	82.8%	

* P<0.05 (significant)

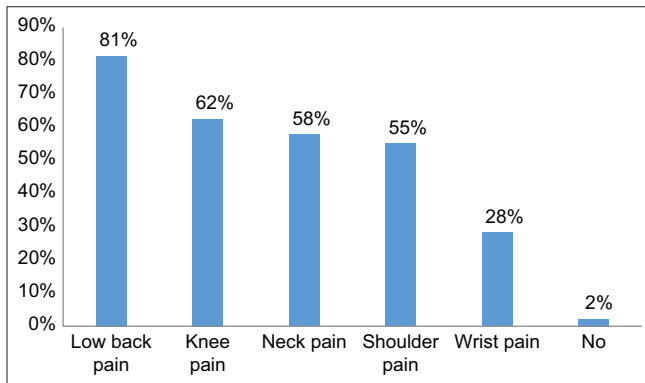


Figure 2: Other sites pain among teachers in Abhasector, Saudi Arabia

Discussion

As known teachers work long hours that involves standing continuously on a daily basis. They are performing all of this activity unintentionally, not even realizing the impact on their bodies. This high performance daily activity will lead to fatigued muscles and joints that have been over worked and over stimulated. Musculoskeletal disorders (MSD) constitutes the most frequent occupational disorders in working populations and their risk factors have been extensively investigated in different occupations.^[23-27] MSD affects the body's muscles, joints, ligaments, bones, and even nerves. Most work-related MSD start gradually and mainly attributed to the work hours or work conditions.^[28-30] These vary from being just discomfort,



Figure 3: The painful foot's areas among teachers in Abha sector, Saudi Arabia

mild pains to more severe or serious medical conditions that requires absence of work and even medical treatment. In more chronic cases, treatment and recovery are often unsatisfactory with possible results of permanent disability and loss of employment.^[30] Beyond simple fatigue and discomfort, more serious health effects can result from working on your feet. Some of these include plantar fasciitis and heel spurs, orthopedic changes in the feet (e.g., flat feet), restricted blood flow, swelling in the feet and legs, varicose veins, and increased chance of arthritis in the knees and hips.^[31]

The current study was conducted to assess the prevalence, pattern, and determinates of foot pain among teachers in Aseer region in the southern part of Saudi Arabia. The study revealed that 85.5% of the teachers complained of foot pain. The pain was moderate among more than half of the complained teachers and severe among only one quarter of them. The pain was mainly in area 1 and area 4 [shown in Figure 2] of the foot which are the areas of long standing focus. This high prevalence may be explained by that most of teachers were females above the age of 35 years [shown in Table 1]. Also some of the teachers complained of disc prolapse and gout which are factors aggravating pain sensation. These findings were nearly supported by few studies focused on musculoskeletal disorders among teachers of which foot and knee pain were detected.^[32-34]

A study was conducted by Vaghella Nirav P, 2018^[35] to find out the prevalence of the MSDs among school teachers and revealed that 25.4% of the teachers complained of foot pain and shoulder pain was recorded among 33%, while 49.9% of the sampled teachers complained of low back pain. Another study was conducted by Solis-s *et al.* 2017^[36] to determine the prevalence of MSD among school teachers from urban and rural areas in Chuquisaca, Bolivia. The study reported that prevalence of MSD in any part of the body was 86% during the last 12 months, 63% during the last 7 days and 15% for work limiting pain. MSD was most common in the neck (12-months prevalence 47%) and least common in the wrist/hands (26%) while foot pain was recorded among 30.4% of the teachers. A systematic review was conducted by Patience N Erick and Derek R Smith, 2011 as a review of musculoskeletal disorders among school teachers. The review covered all articles focused on pain at all body parts. Regarding lower extremities and foot, the researcher found that few studies have investigated MSD of the lower extremities such as hips, legs, knees, ankles and/or feet among teachers. MSD in the lower extremities have been studied by 41.1% and 33% of Brazilian school teachers^[31] and US preschool teachers^[37] respectively. In China, 54.6% of school teachers reported complained lower limb pain during physical activity in the previous month.^[19] Lower extremity pain had been reported among 8.4% of Turkish teachers in the hip area, 32% in the knees, and 21.8% in the ankles.^[38] In another study, 12% of Swedish music teachers reported hip pain, 16% knee pain and 9%-foot pain in the previous 12 months.^[39] The prevalence of pain in the lower extremities of teachers seems to be relatively low when compared to the prevalence of pain in the upper extremities and the back.

These findings are discordant with the current study as low back pain was recorded among 81% of teachers coming on the second order after foot pain followed with knee pain and neck pain. This may be explained by that teachers when answered the tool focused mainly on foot pain with some overestimation for any temporary pain as constant foot pain.

In Saudi Arabia, a study was conducted by Abdulmonem A *et al.* 2014^[40] regarding prevalence of musculoskeletal pain

Table 4: Multiple logistic regression model for predictors of foot pain among teachers

Factors	B	S.E.	P	AOR	95% C.I. for OR	
					Lower	Upper
Age in years	.15	.14	.298	1.16	0.88	1.52
Weight in Kg	.13	.10	.217	1.14	0.93	1.40
Sessions/week	.45	.15	.003*	1.58	1.16	2.13
Work years	.12	.18	.498	1.13	0.79	1.62
Sports	-.20	.06	.043*	0.82	0.66	0.96
Long standing	1.09	.25	.001*	2.97	1.82	4.83
Constant	-.60	.48	.212	0.55		
Model pseudo R ² ; Significance				15.3; .003*		
Model accuracy				85.5%		

SE: standard error. AOR: Adjusted odds ratio. CI: Confidence interval

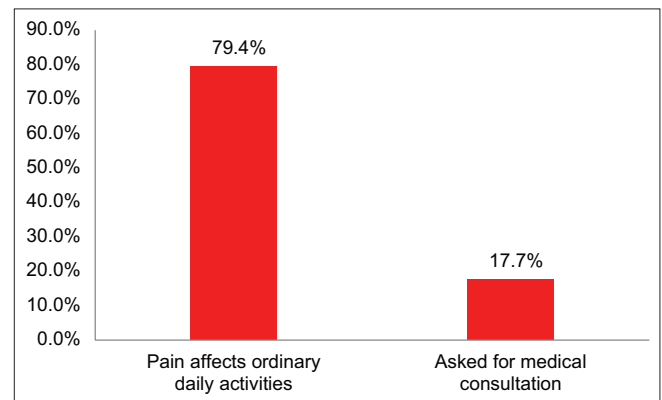


Figure 4: Effects of foot pain ordinary life activities among teachers in Abha sector, Saudi Arabia

and its associated factors among female Saudi school teachers and reported that severe Low back pain was recorded among 38.1% of teacher, followed by knee pain (26.3%), heel (24.1%), shoulder (20.6%), upper back (17.7%), hip joint (16.5%), ankle (12.3%), neck (11.3%). Severe pain of elbow (5.6%) and wrist (7.4%) was the least reported. Pain affected work at school in 46.1% of school teachers. These findings are lower than that recorded among the current study findings but this may be due to the younger age of his sample than the current study teachers.

What all may not know about strategies to rest and recover legs and feet from overuse. The health of our legs and feet can be at risk with the ultra marathoning we do. Not taking time to recover after the day, or working in some preventative strategies throughout the day, can contribute to the risk. The term “accidental athletes” has been used to describe teachers because they work out their legs and feet to the same level of many athletes. It’s the equivalent of running a marathon and the response is fatigue, soreness, and restlessness.

Conclusions and Recommendations

In conclusion, the study revealed that majority of teachers complained of foot pain especially in area 1 and area 4 [Figure 2]. The pain was moderate especially after long standing. The pain was more among old aged teachers with high load of teaching sessions. The foot pain was associated with other sites pain especially lower back and knee. The pain altered the traditional daily activities among more than three quarters of teachers but very few number who asked for medical consultation. Researchers recommended that teachers should be educated about correct standing methods, how to deal with long standing sessions with frequent rest or setting, and the importance of wearing suitable shoes for long sessions. Also more attention should be paid to educate teachers how to reduce musculoskeletal disorders by fitting health physical activity and sports. Teachers' awareness regarding the importance of seeking for medical advice on feeling with pain should be improved through health education sessions.

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Conflicts of interest

There are no conflicts of interest.

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