Original Article

Frequency of Plantar Fasciitis among Females in Teaching Profession

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ABSTRACT

Objective: To find the frequency of plantar fasciitis among females teachers in Sialkot and to explore the relationship of heel pain due to plantar fasciitis with age, body mass index (BMI), type of shoes wearing and standing hours.

Methodology: This cross-sectional study was the project of Sialkot College of physiotherapy (SCPT). It was conducted in February to March 2018 after taking ethical approval from institutional review board of SCPT (IRB-SCPT DPT-115-2018). Sample size was 150 subjects. Female teachers of age ranged 25-60years ,who fulfill inclusion criteria were enrolled by convenience sampling technique from the Sialkot based colleges. Data was collected by administering Plantar Fasciitis Pain/Disability Scale (PFPS) questionnaire among the female teachers. Data was analyzed by SPSS22.

Results: This study was comprised of 150 participants with mean age30.69±5.44years. Mean of height, weight and BMI were 1.63± 0.34, 60.17±11.71, 23.68±4.39 respectively. Mean±SD of visual analogue scale (VAS) and total PFPS scores were 5.78±2.461 and 36.5±13.5 respectively. Of total population 46.3% of subjects have plantar fasciitis. Middle sole of foot was the most affected area by plantar fasciitis (PF), followed by ball of foot, heel and toe with subsequent values52(34.7%),43(28.7%),37(24.7%) and 18(12%) respectively The significant difference in mean VAS score for pain intensity was found among the subjects with and without PF (p value 0.000*). Plantar fasciitis was frequently found in subjects with higher age group than younger ones (p value 0.000*). Current results showed that 31% of total subjects with PF were used to wear flat shoes, whereas only 16 percent wear heel shoes and 23% were using both type of shoes (heel& flat). However this association was not found to be significant on regression analysis. Current results of regression analysis also did not find any significant impact of BMI (p value 0.50) and standing hours (p value 0.804) and types of shoes (p value 0.620) on the development of plantar fasciitis. Plantar fasciitis was positively associated with age (p value 0.002).

Conclusion: Plantar fasciitis is found among teachers, commonly affecting middle sole area of the foot. PF is positively associated with age; however standing hours and BMI was not associated with it.

KEYWORDS: Plantar fasciitis, shoe type, foot wear, teachers, standing hour

INTRODUCTION

Plantar fasciitis (PF) is one of the most common cause of the heel pain.[1] It is appreciated as a thickened fibrous aponeurosis that originates from the medial calcaneal tuberosity and inserted into heads of the metatarsal bones. It holds the medial arch and give tensile strength to metatarsals specially when these bones are subjected to crucial bending forces propulsion or when foot absorbs forces in the stance phase of gait.[2] Inflammation and degenerative changes of plantar fascia due to the repetitive stress and trauma specially on its origin at the medial calcaneal tuberosity of the heel and peri-fascial structures causes PF and subsequent central to medial plantar heel pain. In different studies 11 to 15 % of adult symptomatic foot pain is due to plantar fasciitis.[3]Although it is self-limiting condition, but pain may become chronic and disabling requiring the rehabilitation of patient for several months. It might influences quality of life of patients and limit their physical activity.[1]External

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factors like prolong standing, prolong sitting, walking barefoot, and prolonged weight bearing are intensifying risk factors for this condition.[3]

Intrinsic factors like obesity, foot deformities including pes cavus associated with high medial arch during weight bearing involving intrinsic muscle weakness and pes planus (flat foot) associated with lower or flat medial arch due to which foot pronated excessively and comes directly in contact with the floor and subjected to increase tensile load within the plantar fascia and thereby increasing the risk of the micro-injuries and inflammation.[2,5] Contradictory findings by previous studies have been reported about predisposition of PF among gender, some studies have reported equal predominance of PF in both gender while other showed male or female predominance.[2,6]Evidences are available showing the impact of occupation solely affecting plantar region, causing PF. Occupation involving prolong standing, sitting, running or long walking triggers the pain caused by this conditions.[7] People doing job comprising of long standing hours like teaching have high incidence of developing heel pain due to plantar fasciitis.[2,7]It can also develop due to footwear which doesn't fit properly in feet and can put direct stress at the plantar fascia and this have impact on the mobility.[2] Impairment of the windlass mechanism of foot also causes plantar fasciitis resulting heel pain.[7] Due to the muscular weakness in plantar fasciitis, the fascia of the ipsilateral side of the affected limb becomes thickened and causes stiffness of the foot resulted in greater load beneath the forefoot during gait and disturbs the gait pattern.[8] One of the significant occupation teaching is also associated with this condition but still it is not well studied. Evidences are available showing high prevalence of the musculo-skeletal pain among school teachers. Teachers taking long teaching sessions often suffer from heel, leg and lower back pains. The prevalence of heel pain is high in the old age teachers might be because of reduced elasticity of the plantar fascia and delayed healing process with advancing age.[9] Prolonged standing and using the black board causes tightness of hamstring muscle. Its tightness can lead to the changes in gait mechanics and windlass mechanism of the foot. Increase in the forefoot pressure causes tensile overload and traction injury of plantar fascia attached on the calcaneus bone causing persistent heel pain.[10] Hamstring tightness can also limit the posterior ankle motion that can be compensated by the excessive pronation of the subtalar joints and subsequent increase in tension on the plantar fascia.[10] Evidences are available showing that the heel pain is also intensified by gaining the weight. Excess body weight changes the normal gait mechanics and more weight is shifted to the lower extremities causes' mechanical loading of the foot and plantar fasciitis.[10] Adopting the precautionary measures like reduction in body weight, using comfortable shoes for long teaching sessions and proper standing mechanics for long hours and change in positions after particular gap might cause improvement.[9,11] Many numerous previous researches conducted in Pakistan mainly focused on Musculo-skeletal disorders including back, shoulder and neck pain among teachers while neglecting foot pain associated with plantar fasciitis which severely limit the physical activities. The aim of this study was to explore frequency of plantar fasciitis among the female teachers. We also aimed to assess the impact of possible internal aggravating factors like age, obesity, standing hours and types of shoe wearing on this condition.

METHODOLOGY

It was a cross- sectional study conducted during February to March 2018. This study was project of Sialkot College of Physiotherapy. Ethical approval was granted by institutional review board of mentioned institute (IRB-SCPT-DPT-115-2018). Female teachers of age ranged 25-60 years were enrolled from Sialkot based colleges by convenient sampling technique. Sample size was calculated using 150 sample size at 5% margin of error and 95% confidence interval. House-wives, females belonging to other professions, newly employed teachers (Less than 6 months) and male teachers were also excluded. Teachers with previous history of heel surgery, neuronal disorders, achilles tendinopathy, diabetes mellitus and peripheral vascular disease were also excluded. All relevant information including age, height, weight, BMI and questions related medical history were recorded in predesigned proforma. Plantar Fasciitis Pain or Disability Scale (PFPS) questionnaire was administered among the female teachers. The PFPS questionnaire includes series of questions related to pain and control questions for PF.[12] Unilateral plantar heel pain, more severe when person walks after awaking in morning or prolonged sitting are the characteristic features for PF.[6] PFPS also includes visual analogue scale (VAS) to assess intensity of pain. The VAS scores pain was rating the pain on a scale of 1 to 100 points. Cut off points of VAS scores for intensity of the pain has been recommended as: no pain (0–4 mm), mild pain (5-44 mm), moderate pain (45–74 mm), and severe pain (75–100 mm).[13] PFPS score more than 35 points considered heel pain due to PF.[12] Questions to measure the effect of pain on routine

physical activities were also included in PFPS.[12] Data was entered on SPSS22 for analysis. Numerical data was expressed as mean with standard deviation. Mean age and VAS scores among subjects with and without PF were compared by independent t-test. Frequency and percentages were used to describe categorical data. Regression analysis was used to assess associations of PFPS scores with age, standing hours, types of shoes and BMI. *p*-value ≤ 0.05 was considered to be the statistically significant.

RESULTS

This Study was comprised of 150 participants of mean age 30.69±5.44years. The descriptive statistics of studied population is shown in Table1. Mean ± SD of VAS and total PFPS scores were 5.78±2.461 and

Table 1: Descriptive of the Studied Population (n=150)

Descriptive Parameter	Mean	SD
Age (years)	30.69	5.44
Height (m)	1.63	0.34
Weight (kg)	60.17	11.71
Body mass index (BMI) Kg/m^2	23.68	4.39
VAS	5.78	2.64
PFPS	36.5	13.5

SD: standard deviation, VAS: Visual analogue scale, PFPS: Plantar Fasciitis Pain/Disability Scale

36.5±13.5 respectively (Table1). Of total population 46.3% subjects have plantar fasciitis (Table 2). Middle sole of foot was the most affected area by PF, followed by ball of foot, heel and toe with subsequent

Table 2: Comparison of Age & VAS Score among Subjects with & without Plantar Fasciitis (n=150)

Plantar Fasciitis	Frequency n (%)	Age Mean ±SD	VAS score Mean ± SD
YES	70(46.7)	30.36± 4.15	7.45±2.01
No	80(53.3)	27.58±4.21	4.3±2.2
P value		0.000*	0.000*

p-value ≤ 0.05 is taken significant, VAS: Visual analogue scale

values 52(34.7%), 43(28.7%), 37(24.7%) and 18(12%) respectively. The significant difference in mean VAS score was found among the subject with and without PF (p-value 0.000). PF was frequently found in subjects with higher age group than younger age with p-value 0.000 (Table 2). These results were justified by regression analysis which indicates positive association between age and total score for plantar fasciitis (p-value 0.002) (Table 3).

Our result showed that PF was commonly found in subjects using flat shoes as compared to subjects using heels. Our results showed that 31% total subjects with

Table 3: Regression Analysis between Aggravating Factors and Plantar Fasciitis (n=150)

Independent variable	Beta coefficient (β)	Standard error	p-value
Age	0.0743	0.234	0.002*
Standing hours	-0.01	0.05	0.80
BMI	-0.17	0.25	0.50
Shoe type	-0.61	1.24	0.62

Dependent variable is plantar fasciitis score, p value ≤ 0.05 is taken significant

PF were used to wear flat shoes, whereas only 16 % wear heel shoes and 23% were using both type of shoes (heel and flat). However this association was not found to be significant on regression analysis (p value 0.62). Current results of regression analysis also did not find any significant impact of BMI (p value 0.50) and standing hours (p value 0.80) on the development of plantar fasciitis (Table 3).Physical activities affected by PF are shown in table 4.

Table 4: Physical Activities Affected by Pain Caused by Plantar Fasciitis

Activity	0 = Not at all	1 = Very little	2 = Moderate	3 = Severe
Walking in morning	35(23.3%)	89(59.3%)	23(15.3%)	3(2%)
Standing on toes	54(36%)	58(38.7%)	33(22%)	5(3.3%)
Driving	53(35.3%)	41(27.3%)	49(32.7%)	7(4.7%)
Climbing stairs	8(5.3%)	40(27.7%)	82(54.7%)	20(13.3%)
Bending over	16(10.7%)	35(23.3%)	59(39.3%)	40(26.7%)
Walking bare foot	48(32%)	12(8%)	50(33.3%)	40(26.7%)
Standing after watching movie	49(32.7%)	75(50%)	23(15.3%)	3(2%)
Running for short distance	9(6%)	24(16%)	65(43.3%)	52(34.7%)

DISCUSSION

Teaching profession makes lasting impact in building nations due to its fundamental role in development of students into future productive generation. Teachers' diligent work for long hours involves standing continuously on a daily basis. They are indulged in performing their activities efficiently, not even

realizing the negative impact of those on their physical health particularly affecting musculoskeletal system. During the course of their assigned task, such as frequent reading, preparing lessons and marking of assignments involves head down posture. Moreover, prolong standing and writing on a blackboard during teaching sessions lead to muscle fatigue and overuse of joints, thence prone to musculoskeletal diseases.[14] Despite having important role of teachers for capacity building of our future generation ,teaching profession has not been given sufficient attention in the literature concerning their physical and mental health. Numerous researches have been done concerning back pain and knee and ankle pain. As compared to these area of interest, limited data is available concerning the prevalence of plantar fasciitis which is commonly associated with long working hours, prolong standing, prolong sitting and writing on black boards in the teaching profession.[6,14]

In the current study, 46.7% of studied population was suffering from plantar fasciitis. Contrary to our findings higher percentages of plantar fasciitis was reported by recent study by Alqahtani et al that reported prevalence of 85.5% foot pain among the teacher.[9] In our studied population the most frequent affected area was mid sole region of the foot. In contradiction of our results, study conducted at Saudi Arabia, found heel was the region of the foot being most frequently affected. However, our results concerning second common site and least common areas being affected was ball of foot and fore foot area respectively. These finding are also in accordance with aforementioned study.[9]In present study, Plantar fasciitis was most commonly found in middle age group than the younger ones. These results are confirmed by the regression analysis that showed significant positive association between the age and the development of PF. Our results are justified by the study conducted in Saudi Arabia by Goweda et al, documenting 1.72 times higher risk of plantar fasciitis with increasing age and it is most frequently found in middle age group of 40-60 years.[15] These findings are discordant with Alqahtani et al that reported higher percentages of plantar fasciitis among teachers of older age group with high load of teaching sessions.[9]

Previous studies have reported increased risk of plantar fasciitis with increasing BMI and showed positive association between these.[15,16]Contrary to this; current results did not reveal any significant association between BMI and PF.

Beta coefficient of this shows negative association of occurrence of PF and standing hours. However this association was not found to be significant. But our these results are justified by the previous studies reporting a prolonged sitting as a risk factor for PF.[17] Inconsistent results were reported by Goweda et al reported positive impact of long standing hours and use of tight and improper shoes. Our results are in contrast with the results of Rosenbaum et al reported that high prevalence of PF among the subjects performing the long standing hour's duty.[18] Our result shows that PF was commonly found in subjects using flat wears as compared to subjects using heel foot wear. This finding is aligned with the fact described by Thompson et al who stated that high heels with slight elevation are responsible for offloading the weight at plantar fascia origin on the calcaneus thence reducing the foot pain. This study reported low prevalence of PF among the subject using high heel foot wears.[19] Goweda et al reported that that use of tight and improper shoes predisposes to PF.[18] Plantar heel pain is a common disabling symptom among the teachers. They should avoid prolonged sitting and standing during their duty hours. Teacher being the treasure of one's nation must deserve health authorities' attention in order to avoid suspecting the disabilities concerning the postural discomforts. Hence, health educational sessions should be arranged by the authorities concerning their postural comfort in order to avoid the development of the Plantar Fasciitis and other musculoskeletal disorders.

Limitations: This is cross sectional study so casual relation is not established. Results were not generalized to whole population because of small sample size comprising only female participants. It should be generalized to both genders.

CONCLUSION

Plantar fasciitis is found among teachers, commonly affecting middle sole area of the foot. PF is positively associated with age; however standing hours and BMI was not associated with it.

Recommendations: Future researches on broader scale are recommended to support this study with thorough assessment.

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Conflicts of Interest: None.

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Author's Contribution:

Riaz Hashmi	Study design, acquisition of data and manuscript writing. Revised and approved the articles.
Laiba Naeem	Data acquisition, manuscript writing, Reviewed and approved the manuscript.
Sana Arif	Study design, data analysis and interpretation and write up of results. Revising manuscript critically for important intellectual content.
Umme Habiba	Study design, data collection, contributed to review the article and approved it.
Rabia Irfan Mir	Study design, Data collection, drafting and formatting of final manuscript. Revised and approve the final manuscript.
Maham Zafar	Data collection, revised manuscript and approved it.
	All authors are responsible for the integrity of the data and the accuracy of the data analysis.

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