ORIGINAL ARTICLE

Frequency and Associated Factors of Knee and Low Back Pain among Adults with Pes Planus

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ABSTRACT

Objective: To determine the frequency and associated factors of knee and low back pain among adults with pes planus.

Methods: This cross-sectional study was conducted in Hayatabad Medical Complex Peshawar, Pakistan from May 2017 to November 2017. Two hundred diagnosed Pes Planus patients were included. Questionnaire was used to collect data regarding demographic information, knee and low back pain, foot wear and severity of pes planus.

Results: Out of total 200 patients, mean age of the patients was 29.14±7.69 years. Knee pain was observed in 123 (61.5%) participants, back pain in 110 (55%) whereas both knee and back pain was observed in 83 (41.5%) patients. Knee pain was significantly associated with age (p-value 0.001), gender (p-value 0.032), BMI (p-value 0.006) and occupation. Back pain was significantly associated with age (p-value 0012), gender (p-value <0.001), BMI (p-value 0.025), occupation (p-value <0.001), and orthotic device (p-value 0.02) whereas both knee and back pain was significantly associated with gender (p-value <0.001), BMI (p-value 0.038), occupation (p-value 0.031), and orthotic device (p-value 0.048).

Conclusion: The frequency of low back pain and knee pain was high among adults with pes planus. Age, gender, BMI, and profession are significantly associated with low back and knee pain in individuals with pes planus.

Key words: Flat shoes, knee, low back pain, pes planus.

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INTRODUCTION

Foot plays an important role in absorbing mechanical stresses. It also allows joint motion at lower extremity level. Therefore, foot problems result in reduced quality of life among general population.[1] Modifications in skeletal structure of the foot such as pes planus deformity leads to abnormal walking pattern and excessive loading on soft tissues.[2] Foot posture is of great importance for normal walking pattern.[3] In Pes planus deformity,medial longitudinal arch is partially or fully collapsed due to heel valgus

deformity and prominent medial talar head.[4] Globally, 15-20% of adults suffer from pes planus deformity.[5] There are predominantly three types of pes planus mild, moderate that are classified as flexible pes planus while the severe form of pes planus is classified as rigid pes planus.[6] Previous research studies reported that obesity, foot eqvinus deformity, tibial torsion, development of additional navicular bone and improper use of foot wear are associated with pes planus deformity.[5,7]

Various studies have reported that pes planus can lead to numerous serious conditions including plantar fasciitis, bunions, heel pain, shin splints, hammer toes and most important knee and low back pain.[5,8 9] The pes planus deformity contributes to both tibiofemoral and patellofemoral joint pathology as during many physical or weight bearing activities the motion and posture of foot and knee are coupled in a closed chain position.[10] This closed chain coupling links the planus foot deformity to excessive internal rotation of lower limb.[11] Hence planus foot causes increasing episodes of knee pain.[12] Moreover, due to internal rotation of lower limb with planus foot deformity, episodes of low back pain are common among adults with Pes planus.[13]

Despite the fact that biomechanical faults of foot may have overwhelming consequences on whole body, clinicians often skip foot assessment in knee and low back patients and majority of patients even not consider foot problems to be the cause of their knee and low back pain. This study was conducted with the aim to determine the frequency and associated factors of knee and low back pain among adults with pes planus.

METHODS

This cross-sectional study was conducted at Hayatabad Medical Complex Peshawar, Pakistan from May 2017 to November 2017. Two hundred participants with diagnosed Pes Planus were consecutively included in the study. Patients with recent history of major surgeries, trauma or other co-morbidities were excluded. Ethical approval was obtained from institutional research review committee of Mahboob School of Physiotherapy Peshawar, Pakistan (IRB #: DIR/MSP/-EB/EC/00231).

Pes planus diagnosis was confirmed after thorough examination by orthopedic surgeons and physical therapists. Different tests such as gait tests, palpation for prominent navicular bone, and pronation of the mid foot, everted heel bone and windlass test were performed for differential diagnosis[2]. Subjects who were walking on the medial border of foot with foot in pronation and volar surface of the foot was completely in contact with the ground and with excessive navicular tilt and everted heel bone on standing were considered to be flat footed. The windlass test was performed in weight bearing position and was considered positive for participants whose big toe extension was less than 30degree. In windlass test, the participants whose medial longitudinal arch was slightly flattened were classified as mild case of pes planus, while those who had severely flattened medial longitudinal arch with some flexibility were classified as moderate case of pes planus and the participants whose medial longitudinal arch was severely flattened and rigid to the extent that it was unable to regain its normal alignment were considered as severe(rigid) pes planus cases.[10,14]

Informed consent was taken from all participants using consent form designed in local language. Questionnaire having questions regarding demographic information, knee and low back pain, foot wear and severity of pes planus was designed to collect data from participants while Body Mass Index (BMI) was calculated according to general rules as BMI = weight in kilogram / (Height in meter)^2**.** The WHO definitions for BMI for Asians (Normal18.5–22.5 Kg/m2, overweight 23–24.9 Kg/m2 and obesity ≥25 Kg/m2)were used in this study.[15,16] Data were analyzed using

Table 1: Comparison of knee and low back pain among adults with pes planus with general characteristics of the patients (n=200)

		Knee Pain			Back Pain			Both back and knee pain		
	Total	Yes (n=123)	No (n=77)	p-value	Yes (n=110)	No (n=90)	p-value	Yes (n=83)	No (n=117)	p-value
Age, years										
≤30	123	65 (52.8)	58 (47.2)	0.001	59 (48)	64 (52)	0.012	45 (38.6)	78 (63.4)	0.075
>30	77	58 (75.3)	19 (24.7)		51 (66.2)	26 (33.8)		38 (49.4)	39 (50.6)	
Gender										
Male	70	36 (51.4)	34 (48.6)	0.032	25 (35.7)	45 (64.3)	<0.001	17 (24.3)	53 (75.7)	<0.001
Female	130	87 (66.9)	43 (33.1)		85 (65.4)	45 (34.6)		66 (50.8)	64 (49.2)	
BMI										
Underweight	8	2 (25)	6 (75)	0.006	4 (50)	4 (50)	0.025	2 (25)	6 (75)	0.038
Normal	90	50 (55.6)	40 (44.4)		40 (44.4)	50 (55.6)		30 (33.3)	60 (66.7)	
Overweight	57	35 (61.4)	22 (38.6)		34 (59.6)	23 (40.4)		25 (43.9)	32 (56.1)	
Obese	45	36 (80)	9 (20)		32 (71.1)	13 (28.9)		26 (57.8)	19 (42.2)	
Occupation										
Student	57	26 (45.6)	31 (54.4)	0.03	22 (38.6)	35 (61.4)	<0.001	17 (29.8)	40 (70.2)	0.031
Teacher	10	7 (70)	3 (30)		7 (70)	3 (30)		5 (50)	5 (50)	
Labour	11	9 (81.8)	2 (18.2)		4 (36.4)	7 (63.6)		3 (27.3)	8 (72.7)	
Housewife	68	48 (70.6)	20 (29.4)		50 (73.5)	18 (26.5)		38 (55.9)	30 (44.1)	
Other	54	33 (61.1)	21 (38.9)		27 (50)	27 (50)		20 (37)	34 (63)	
Orthotic Device										
Yes	37	21 (56.8)	16 (43.2)	0.511	14 (37.8)	23 (62.2)	0.02	10 (27)	27 (73)	0.048
No	163	102 (62.6)	61 (37.4)		96 (58.9)	67 (41.1)		73 (44.8)	90 (55.2)	
Types of shoes										
Flat Shoes	178	111 (62.4)	67 (37.6)	0.477	95 (53.4)	83 (46.6)	0.188	73 (41)	105 (59)	0.69
Heels	22	12 (54.5)	10 (45.5)		15 (68.2)	7 (31.8)		10 (45.5)	12 (54.5)	

All data presented as number (%)
Chisquare test was applied, p-value <0.05 was taken as sifnificant

Table 2: Frequency and percentages of back and / or knee pain in participants wearing different types of foot wear

Foot wear	Back Pain	Total	Knee pain		
			Yes	No	p-value
Flat Shoes (n=178)	Yes	95 (100%)	73 (76.8%)	22 (23.2%)	<0.001
	No	83 (100%)	38 (45.8%)	45 (54.2%)	
Heels (n=22)	Yes	15 (100%)	10 (66.7%)	5 (33.3%)	0.095
	No	7 (100%)	2 (28.6%)	5 (71.4%)	

All data presented as number (%)
Chi-square test applied, p-value <0.05 taken as significant

SPSS version 20. Frequencies and percentages were calculated for variables and chi square test was used to find out associations. P-value <0.05 was taken as significant.

RESULTS

A total of 200 patients were included in the study. The mean age of the participants was 29.14±7.69 years.

Knee pain was observed in 123 (61.5%) participants, back pain in 110 (55%) whereas both knee and back pain was observed in 83 (41.5%) patients.

Age greater than 30 years was significantly associated with knee (p=0.001) and back (p=0.012) pain while insignificantly

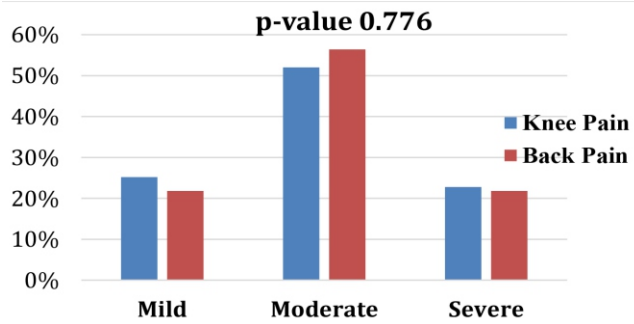

Figure 1: Comparison of knee and low back pain with severity

associated with both knee and back pain (p=0.075). One hundred and thirty (65%) participants were females while 70 (35%) participants were males. Female gender was significantly associated with knee (p=0.032), back (p<0.001) and both knee and back

((p<0.001) pain. Ninety (45%) participants had normal BMI, 8(4%) participants were underweight, 57 (28%) were overweight and 45 (22%) were obese. BMI was significantly associated with knee pain (p=0.006), back pain (p=0.025) and both knee and back (p=0.038) pain. Occupation of majority of the participants (n=68, 34%) were housewives, 57 (28.5%) were students, 11 (5.5%) were laborers, 10 (5.0%) were teachers while remaining 54 (27.0%) were having other professions. Profession was also significantly associated with knee (p=0.03), back (p<0.001) and both knee and back (p=0.031) pain. Only 37 (18.5%) participants were using orthotic devices while remaining 163 (81.5%) participants did not used any orthotic devices. (Table 1)

One hundred and seventy-eight (89%) participants were using flat Shoes. Of these 178 participants who were using flat shoes, 95 had back pain, out of which 73 (76.8%) had knee pain as well while 22 (23.2%) had no knee pain (p<0.001). On the other hand, only 22 (11%) participants were using heels. Of these 22 participants 15 had back pain, out of which 10 (66.7%) had knee pain while 5 (33.3%) had no knee pain (p=0.095). (Table 2) Analysis of severity of pain described that majority of participants who reported pain had moderate knee (n=64, 52%) and back (62, n=56.4%) pain. (Figure 1).

DISCUSSION

Foot structure and functionally plays important role in maintaining lower extremity mechanics. Changes in foot structure causes change in the biomechanics of lower extremity. This change in biomechanics may lead to serious problems including pain and deformity in knee and back.[17,18] This study was designed to find the frequency and association of knee and back pain with pes planus. Majority of participants in current study were in third and fourth decade of their life and most of them were females. BMI calculation of participants showed that most of participants were either overweight or obese.

The findings of current study showed that majority of participants with pes planus had both knee and back pain. Previous research studies also reported high prevalence of knee and low back pain among adults with pes planus.[5, 13, 19] Due to changes in biomechanics of foot in pes planus adults, additional stress on knee and back region prone these individuals to low back and knee pain.[13] Conducted a similar study to find association of flat foot with knee pain and physical disability. The results of their study reported that bilateral flat feet individuals had significantly higher scores of knee pain, and physical disability.[19]Another study done by Beckett et al. reported that improper gait due to pronated feet may be the cause of biomechanical abnormality that leads to knee and back problems in pes planus adults.[20]

Majority of participants with normal BMI did not report either back or knee pain. Literature also suggests that there is strong connection of obesity or being overweight on foot arches that consequently increases the incidence of pes planus.[21] Overweight and obesity is a global problem in modern world. Besides other systemic problems, they are one of the leading causes of low back and knee pain in general population.[22] In adults with pes planus, obesity affects both anatomical and biomechanical aspects of body[7].

Previous studies reported association between footwear and back and knee pain.[12,23,24] The major problem in current study was that that majority of participants used flat shoes and only minority used shoes with heels. Due to pes planus deformity, majority of participants avoid shoes with heel. Literature also supports the fact that as pes planus progresses, biomechanical abnormalities also increases; due to which patients adopt compensatory mechanisms.[25]

The findings of the study could be noted in the light of limitation that the sample size of

current study was small and study settings include only one tertiary care hospital that's why generalizability of the results of current study is questionable. Large surveys are required to truly determine factors responsible for low back and knee pain in these individuals.

CONCLUSION

The frequency of low back and knee pain was high among adults with pes planus. Age, gender, BMI, and profession are significantly associated with low back and knee pain in individuals with pes planus.

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